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GENERAL NEWS SECTION

*Illustrated.

Strikes of State Employees

One of the arguments frequently advanced for government ownership of different industries is that it will prevent labor trouble. For example, a committee of the United States Senate recently has reported in favor of public ownership of coal mines as a preventive of such strikes as the recent one in West Virginia. Likewise the argument that it will obviate labor troubles is often put forward in favor of public ownership of railroads. While this contention is frequently made, experience constantly rises to refute it. South Africa is now in the throes of a railway strike which is causing great public suffering and loss, and the railways on which this strike prevails are owned and operated by the public. Going back to 1910, we find the employees of the state railways of France striking along with those of the private railways. Only a year before, in March, 1909, five or six thousand of the government telegraph clerks and postmen of France went on strike; and only recently there have been serious threats of a walkout of the postal employees of Great Britain. In 1904 there was a serious strike on the state railways of Hungary; while in 1903 there was one on the state railways of Victoria. So the strike in South Africa is by no means without precedent. Public ownership undoubtedly tends to prevent strikes in Prussia, but this is because there the government forbids state employees to belong to unions, which hinders concerted action by them; and it would promptly suppress a strike by military force even if one did occur. The argument for public ownership based on its alleged tendency to prevent labor troubles is far from convincing as applied to democratic countries.

Quoting Tariffs at Small Stations

The station agent at a small town in Michigan says that he has on file at all times about 200 lb. of freight tariffs; and that 99 per cent. of them are never used; and in view of the fact that the telephone is nowadays universal, he suggests that all freight rate—and passenger rate—inquiries, except where the agent has the answer at his tongue's end, ought to be referred to a central office; say one office for each division of a railway. This suggestion is so obviously sensible that it needs no recommendation. Every freight agent and every passenger agent knows its value. The idea is already in force to some extent; for local agents are all the time encountering perplexities in rate making which can be settled only by telegraphing (or telephoning) to headquarters. Why not make this practice the rule? The improved facility is due to the public. A man with a legitimate inquiry ought not to be kept waiting from five to twenty minutes while an inexperienced agent or clerk studies, first, the principle on which his tariffs are made and, second, how to apply the principle to the immediate question in hand. And all agents and clerks, except those at the largest offices, are necessarily inexperienced, because of the enormous extent of the ramifications of present-day tariffs. A company cannot afford to give a clerk the necessary experience, unless he is going to have a considerable volume of business to attend to, for it is a slow acquisition. Thousands of stations are in the same situation as that of our Michigan correspondent. A tariff weighing two pounds—a hundredth of the weight mentioned—would contain all the rates that a station agent could fairly make himself master of. The figures which have been published showing the weight and cost of the tariffs filed by the eastern roads at Washington when they applied for authority to advance freight rates are really startling, to those not familiar with tariff making. Why is it that we are not sufficiently startled to start a reform? Besides the saving in time for the persons interested, the economy in printing is appreciable; and the promotion of neatness in stations by reducing the bulk of the tariffs would be an improvement.

**The Wheelbarrow
a New
Station Facility**

Our Michigan friend calls attention to another of the problems of the country station which the agent is never able to solve; that of attending properly to the wants of all his patrons during the fifteen or twenty minutes prior to the departure of important passenger trains. The country agent, with his tickets, telegraph, express matter and baggage, has long been the champion "lightning-change" expert; and at many places he has the additional duty of carrying the mail bags to and from the post office. As the four principal branches of the work can usually be attended to within a few yards of the office desk the alert and energetic agent can partly solve his problem nearly all of the time; but the occasions when passengers are completely satisfied are likely to be few and far between; for the agent so often gives imperfect service because of necessity that he is likely to become habitually negligent of the little courtesies which are necessary to the best service. Our correspondent brings up this question at this time because of the new rule of the post office department admitting to the mail bags parcels weighing 50 lb. He had to get a wheelbarrow at once. He thinks that when he is on his journeys to and from the post office the drummer with three 250-lb. sample trunks may some day get neglected. The small-town station agent has worries enough when he has only to wait for the—to him—intolerably slow movements of his superior officers in dealing with his demands for improved conditions; to be burdened now with the worse affliction of waiting for the postmaster general will, indeed, increase the number of his sympathizers. The country agent has, in one respect, the most difficult job in the whole field of railway operation; he is giving the public a service which is not intended to be first class. This is not said by way of reproach; first class service is in many situations practically out of the question, except as the superintendent can find a genius to fill the place. And geniuses are always rare, and hard to find.

MORE AUTHORITY FOR THE COMMISSION OVER RATES

IN his address to the Traffic Club of Chicago on January 16, Commissioner Charles A. Prouty advocated giving the Interstate Commerce Commission more authority over rates. Just how much more authority he would give he did not clearly indicate. It might be inferred from some of his remarks that he would grant the power to initiate all rates and classifications. If this is what Mr. Prouty meant, most shippers and railway officers will dissent.

It is true, as Mr. Prouty pointed out, that the railway traffic men cannot now advance any rate without the commission's consent; and the commission can reduce any rate already in effect. But under present conditions, the army of traffic men of all ranks employed by the railways and scattered throughout the country keep more familiar with general and local industrial and commercial conditions, and the changes occurring in them, than the commission could ever become, unless it duplicated the entire present traffic organization of the railways. Most of the proposals for changes of rates are initiated by the traffic men, and therefore the proposals and the action taken on them by the traffic executive officers are much more likely to reflect and be responsive to conditions than would rates initiated by the commission and its subordinates.

Mr. Prouty said that giving the commission more authority over rates would make them more stable, and that stability is more needed than elasticity. That depends on what is meant by elasticity and stability. If by stable rates is meant rates which change in response to changing competitive and industrial conditions, and not otherwise, then stability is desirable. But if by a stable rate structure is meant one which is rigid, and does not adjust itself to conditions, but to which conditions must be adjusted, then elasticity is greatly preferable to stability. And a rigid rate structure is what we inevitably would have if the in-

itiative in fixing rates were transferred entirely from the railway traffic men to the commission.

Mr. Prouty animadverted on the complexity of rates as now made, and referred to the small volumes in which the rates of New Zealand and Germany are published. The railway mileage of New Zealand is 2,800 miles, and that of Germany 38,000, while the mileage of the United States is 250,000 miles; and the diversity and mobility of conditions in this country are incomparably great. Furthermore, Mr. Prouty's reference to the simplicity of German rates might easily mislead. The British commission which a few years ago made a report to the Board of Trade on German railways referred to the "complications of the tariffs" of the Prussian state railways, and remarked that after an attempt had been made to simplify them "the catalog of the rate books in existence shows that there are approximately 1,000 different published books of rates." And the Prussian roads have only 24,000 miles of line.

However, while present conditions in this country do not demand and would not justify transferring to the commission the entire power of making rates and classifications, there are strong reasons in favor of increasing its authority to regulate them. The main purpose of most of the legislation respecting interstate rates which has been passed has been to stop and prevent unfair discriminations. While the number of unfair discriminations has been greatly reduced they have not all been abolished, nor is it possible for the commission with the power given to it by the existing laws, entirely to stop them.

The reason is that discriminations may be effected and perpetuated by making or keeping rates too low as well as too high, and that while the commission has authority to keep rates from being made or kept too high, it has no authority whatever to keep them from being made or kept too low. When, therefore, it finds a discrimination, the only thing it can do to correct it is to order a reduction of some rate or rates, although the really fair way to correct it may be to order an advance in some other rate or rates. The railway or railways responsible for the discrimination may then, if so disposed, at once reduce other related rates and thereby restore the discrimination. Almost everybody now agrees that the general level of rates in the United States is not too high, but is probably too low. On the other hand, everybody in close touch with the railway business knows that there are numerous rates in effect which are relatively too low; that in most cases such rates work an unfair discrimination in favor of certain large shippers or large communities, and that in many cases they have been made for this express purpose.

Manifestly, this is a condition which ought to be corrected. Experience has shown that it cannot be corrected without additional legislation. It would appear, however, that it can be remedied without transferring to the Interstate Commerce Commission the entire power of initiating rates. It probably would be remedied by legislation containing the following provisions:

First, that the Interstate Commerce Commission should have authority, when it found a rate unjust, whether because too high or too low, to fix the absolute rate thereafter to be charged, instead of as now, merely the maximum rate. This would give the commission authority to raise as well as reduce rates.

Second, that the commission should have authority to suspend and, after hearing, prohibit any proposed change in rates which it might find unreasonable or unfair. This would give it control over both advances and reductions, whereas, now it has power over only advances; and a discrimination may be accomplished just as effectively by a reduction as by an advance.

Third, that any railway might complain to the commission regarding any rate made or proposed by any other road which it believes to be unfair and adapted to injure the complaining railway. Under the law as it now stands a bargain may be struck by a railway and a big shipper or community for a reduction in rates which is opposed by all competing railways, and which may be unjust to all the other railways as well as to all the other shippers. Why, in such circumstances, should not the in-

jured railway or railways have the same right to ask for protection from the commission that an injured shipper has?

It is believed legislation of the character outlined above is desirable and would have wholesome effects. It is extremely questionable whether any greater increase at this time in the commission's authority over rates would be beneficial.

RESULTS OF EXPERIENCE IN REGULATION OF SECURITY ISSUES

INCLUDED in the annual report of the New York Public Service Commission, Second district, of which an abstract is published elsewhere, is a report of the division of capitalization. The division was organized in October, 1911, and while, of course, the bulk of its work has been to pass upon issues of securities of public service corporations other than steam roads, it has been called upon to authorize the issuance of securities by the Delaware & Hudson, Erie, Lehigh Valley, Long Island, New York Central, and Ontario & Western. The spirit which actuates the commission is well summed up in the following, which is taken from the commission's report:

While the commission does not, in making authorizations of securities, in any way guarantee that the securities so authorized are a good investment, yet it is earnestly endeavoring to bring it about that the financial statements on the basis of which such securities are sold may be such that the investor will not be misled.

The commission goes on to express the opinion that no other single agency will in the end result in better service or lower rates than an effective regulation of the financing of public service corporations. The sweepingness of this statement may be somewhat discounted because of the natural enthusiasm of those engaged in the work; but the ideals which this division of the commission is endeavoring to establish are entirely praiseworthy and its practical grasp of the problem is considerable.

The purpose for which the New York state law provides that money may be raised by railroad companies by the issue of capital securities may be divided as between money to be spent in the future on capital account, money to reimburse the treasury for expenditures already made on capital account, and refunding of obligations. As in any sound accounting, the commission bases its accounts on cost. The commission found a tendency on the part of the public service corporations—and this probably applies rather to telephone and electric companies than to steam roads—to capitalize and issue securities against replacements of property. This difficulty the commission is seeking to overcome through a strict insistence on a uniform system of accounting which makes a clear distinction between expenses and expenditures for additions and betterments, and a proper use of depreciation accounts. Another difficulty which the commission met with was that when one corporation wanted to buy the plant and property of a smaller and less economically managed concern in the same business it could not acquire this property at bare cost. In this regard the commission has taken a broad, businesslike view of the situation and has decided that it is for the "best interests of all concerned to permit corporations with generating stations of large capacity which operate at a less cost to acquire small plants in their territory, which results in some cases in the immediate retirement and abandonment of a considerable portion of the physical property acquired," and to permit such purchases at prices not in excess of the reasonable market price. The commission has then required the purchasing company to amortize the difference between the inventory cost of the physical property taken over and the price paid, such amortization being charged to earnings over a reasonable period of years.

This is a thoroughly sound principle and is analogous to the principle which permits of the issue of stock at less than par or bonds at a discount, requiring, however, that the difference between the sales price and the par value or face value shall be

charged off during the life of the securities or, in the case of stock, during a reasonable period of years.

The commission has found it necessary to check up by actual physical examination the items for which money was spent in the past and against which floating debt was incurred which the company has, since the creation of the commission, desired to pay off through the issuance of capital securities. The commission quite properly takes a serious view of its responsibilities in authorizing the issue of securities for such purposes. It is fully aware of the fact that its stamp of approval on the issue of securities makes these securities more readily marketable, and that therefore it assumes a real responsibility toward the investor in giving such approval. This is one of the great dangers of governmental regulation of the issuance of securities, namely, that an exaggerated impression of government guarantee will be given to such securities.

The New York commission's attitude in this matter is both sensible and practicable. It undertakes to be "reasonably certain that none of the purposes for which the securities were authorized are reasonably chargeable to operating expenses or to income." Insofar as this is a guarantee to the investor it is one which an able commission can properly give.

The sum and substance of the commission's report on this phase of its work is, that it is slowly meeting with success.

MR. THORNE AND SENATOR KENYON ON GOVERNMENT OWNERSHIP

SENATOR KENYON of Iowa this week presented to the United States Senate his much heralded reasons for believing the government could save the people a large amount of money by acquiring the railways. The data submitted do not meet the expectations raised by the senator's able press agents. They are practically the same amusing buncombe which Clifford Thorne of the Iowa railroad commission a short time ago jumbled together and made public, and which already has been refuted by President Ripley of the Atchison, Topeka & Santa Fe, the *Railway Age Gazette* and other persons and publications.

Mr. Thorne had told Mr. Kenyon, and Mr. Kenyon told the United States Senate, that by the mere process of government acquisition there could be saved \$414,659,370 a year. Note the minute accuracy of the estimate. Not even the final \$70 is omitted. The saving would be exactly \$414,659,370. Mr. Thorne's original speech on this general subject was answered in the *Railway Age Gazette* of November 7, 1913. It was there pointed out that he had made a mistake—a mere trifle, of course—of \$211,000,000 in the annual interest and dividends paid by the railways. In the so-called "report" which he has now furnished to Senator Kenyon he tacitly admits this error and estimates at only \$250,000,000 the saving in the cost of capital which could be made, seeking—and, of course, finding—elsewhere the additional economy. As heretofore, he estimates, on the alleged basis of current market prices, that the railways could be acquired for less than \$14,000,000,000. Even assuming that Mr. Thorne's estimate of the present market value of the securities is correct, everybody knows that the government could not acquire the railways on that basis simply because, first, prices when Mr. Thorne made his computation were the lowest they had been in years, and second, an extensive buying movement, whether conducted by the government or private individuals, would cause a rapid increase in the market price of railway securities. There is no evidence worth considering that the railways could be acquired for less than \$16,000,000,000, and their cost would probably be more.

The figures which Mr. Thorne has solemnly given Senator Kenyon, and Senator Kenyon has solemnly given the United States Senate, recall the estimates originally made regarding the cost of acquisition and development by the government of the telegraph lines in Great Britain. When the bill for their

acquisition was introduced in Parliament the Chancellor of the Exchequer placed their cost at between \$15,000,000 and \$20,000,000; but they cost the government almost \$40,000,000. The chancellor estimated that it would require \$1,000,000 to \$1,500,000 to make needed extensions of the lines; but the extensions cost \$8,500,000.

Mr. Thorne continues to report that the government could borrow the money to buy the railways at 3 per cent. He ignores, or does not know, the fact that the main reason for the current prices of United States government bonds is that they may be used as a basis for the issuance of national bank notes and as security for government deposits in the banks. Under present conditions there is no way of telling what United States government bonds would sell for simply as an investment. Perhaps, however, the experience of the government which owns the most important system of state railways, namely, Prussia, may throw some light on this matter. A despatch from Berlin on January 16, announced that the loan of \$100,000,000 to be floated by the government of Prussia on January 29 is to take the shape of a new form of 4 per cent. treasury warrants which are to be sold at 97, and which are to be redeemable at par in from one to sixteen years. In other words, while Mr. Thorne is saying that the government of the United States could issue \$14,000,000,000 in securities at 3 per cent., the Prussian government is unable to issue even \$100,000,000 of 4 per cent. securities at par. It is inconceivable that under present conditions the government of the United States could issue any large volume of securities at par unless they yielded approximately 4 per cent.

Not only are the estimates made as to the amount which could be saved in return to capital under government ownership of railways demonstrably absurd, but even if they were demonstrably correct they would not go to the heart of the question of government ownership. The operating income of the railways of the United States in the fiscal year 1911—in other words, what they had left after paying expenses and taxes—was \$768,000,000. The total interest and dividends paid by them were \$672,000,000. Their total operating expenses were \$1,915,000,000. The operating expenses being 150 per cent. greater than the net operating income and 160 per cent. greater than the total interest and dividends, it follows that the effect which the adoption of government ownership would produce on operating expenses is 150 per cent. more important than the effect it would produce on net operating income and 160 per cent. more important than the effect it would have on the return paid to capital. Now, Mr. Thorne and Senator Kenyon practically ignore the effect government ownership would have on expenses. They talk about reducing the fancy salaries of the higher officers, but the salaries of all railway officers are only 2 per cent. of the total operating expenses and only 1.3 per cent. as much as the total earnings. There is always much talk of the economies in operation that will result from consolidation of railways, but there is no country in the world where the adoption of government ownership has not been followed by an increase, and usually a heavy increase, in expenses, except possibly in Prussia and Japan. The experience of the world, except in Prussia and Japan, has been that government operation is more expensive and much more expensive than private operation.

Now, a reduction of 50 per cent. in the return paid to capital in this country would amount to only \$336,000,000 a year, while an increase of 20 per cent. in operating expenses would amount to an increase of 20 per cent. in operating expenses would amount to \$382,000,000 a year; and, while such a reduction in return to capital is not conceivable, such an increase in operating expenses under government ownership is readily conceivable by anybody who has studied the statistics of the state railways of the world. Take the cases of the two large railways which have most recently been acquired by governments, the Northern Railway in Austria and

the Western Railway in France. Under private management the Northern Railway of Austria paid dividends of 12½ per cent.; under government ownership its profits have been changed into a deficit. The reason for this, said M. Patti, president of the Austrian Chamber of Deputies, in an oft-quoted speech, is that the government "enlisted an army of new employees" and "went much too far into the reduction of hours of labor." So, under private management in 1908 the Western Railway of France had expenses of \$29,600,000, while in 1913 the expenses were \$45,000,000, an advance in five years of 52 per cent. In consequence, its deficit increased from \$12,000,000 in 1908 to over \$17,000,000 in 1913.

Another point of vital importance is the probable political effects of the adoption of government ownership. Government acquisition of the railways would transfer to government service 1,700,000 men. The acquisition of the railways would involve the acquisition of the express business, the sleeping car business and so on. There already is a large army of men in the employ of the government, especially in the postal department. It is also proposed to acquire the telegraph and telephone lines; and the American Telegraph & Telephone Company alone has 129,000 employees. At this rate the government would speedily have on its payroll from 2,500,000 to 3,000,000 voters. These voters, unless they were prohibited from belonging to unions and disfranchised, would inevitably resort to the methods of unionism or to political influence, or to both to coerce the government into giving them such conditions of work and wages as they might demand.

France today presents the best example of what would be the results. There are some 8,000,000 voters in France, and at least 900,000 of them are employees of the state, a large proportion being on the two state railways. In his book, entitled "Problems of Power," William Morton Fullerton, an English writer, has described in a striking way the conditions that this has produced.

"The civil servants have been rapidly grouped into organizations designed to get from the state everything they can. At present there are in France at least 488 professional associations of state employees in the big central government offices, and 202 unions representing the state employees in the match factories, the tobacco factories, the mint, the state railways, etc. These various unions are united in a general federation, "and it is this colossal new force which has been encouraged by the state which was suddenly brought to the notice of the public by the postmen's strike of March, 1909." The member of Parliament, Mr. Fullerton says, has become a "traveling salesman of political or social favors and jimcracks in return for votes for local influence"; and "government in France is the tyrannical monopoly of a minority," and that minority being the organized forces of the state employees, who, because they are organized, can make and unmake members of Parliament, and therefore can compel them to give them at the expense of the French taxpayer everything which they may see fit to demand.

If there is to be investigation and discussion of government ownership, let us have it investigated and discussed in all its important phases. If that shall be done there will be no danger of its adoption under the conditions now existing in this country.

Mr. Kenyon asks for the appointment of a commission to investigate the results of government ownership in other countries. It is not at all undesirable but rather desirable that such a commission should be appointed but the scope of its inquiry should be so broadened that it will not only investigate the results of government ownership in other countries but also what probably would be the results in this country under the economic and political conditions existing here. A mere inquiry into the results of government ownership in other countries would ignore the most important features of the question as it presents itself to the people of this country.

Improving Movement of Freight Cars

Why Car Mileage Per Day Is Small, and Means for Increasing It. "The Way to Make Cars Is to Move Them"

By E. D. LEVY

Assistant General Manager, St. Louis & San Francisco

In an article appearing in the *Railway Age Gazette* for August 1, entitled, "Getting More Movement for Freight Cars," Arthur Hale concluded his remarks with the statement, "There is one other matter, however, which cannot be neglected if we are to have more movement for our freight cars. The roads must have plenty of freight engines, and the engines must be in good repair. It must be understood that a train of cars, even of empty cars, is worth more than an engine, and its delay costs more than the delay to an engine. Cars, therefore, should not wait for engines, but engines should always be ready when a train is ready."

A freight car shortage is very often a misnomer. It is true there is at times a shortage of cars, due to the inability of the carriers to furnish cars as fast as the shippers require them, but this is produced, to a large degree, by shippers loading cars in excess of the ability of the carriers to move them, usually producing a congestion, and by congestion I do not mean a blocked railroad, but I mean that the road movement is so heavy that the movement necessarily slows up.

Taking the statistics of the Interstate Commerce Commission for all roads having an earning capacity of \$100,000 gross, the carriers owned in 1902, 1,995,192 freight cars; in 1912, 2,202,966, an increase of 696,974 cars, or 46.28 per cent.

The total capacity of freight cars, in tons, for the same carriers, was, in 1902, 42,292,977; and in 1912, 82,647,959, an increased carrying capacity of 40,354,982, or 95.41 per cent.

The average capacity of freight cars, in tons, in 1902, was 28; in 1912, 37.5, an increase of 9.5, or 33.92 per cent. (The above figures are taken from statistics compiled by the American Railway Association.)

In 1902, the average tons per loaded car mile was 16.9; in 1912, 21.8, an increase of 4.9, or 28.99 per cent. In other words, the carriers have provided an average increased carrying capacity of 9.5 tons, while shippers have only utilized 4.9 tons, or 51.26 per cent.

It is a fact so well known by posted railroad men, that if shippers utilized the additional carrying capacity provided by the carriers there would be no car shortage, that I almost hesitate to make the statement for fear it would be said that my remarks contain no information.

DIFFICULTIES OF INCREASING CAR MOVEMENT

I am not attempting to defend in any way the low average mileage of freight cars in this country, according to Mr. Hale, the maximum movement reported to the American Railway Association by its members, being in October and November, 1912, when the movement reached 26 miles per day; but I want to say something of the difficulties confronting the operating officers in making even that number of miles per day.

The law in most states, and the uniform demurrage rules approved by the Interstate Commerce Commission, allow shippers two days' free time, exclusive of Sundays and holidays, to load or unload a car from the first 7 a. m. after it is placed, which often means three days.

The average haul per car is 138 miles. A car cannot be started in motion the minute a shipper releases it. It must be switched from his track to the yards and put in the proper train, and when it reaches destination it must be switched out of the train and to the unloading track. Allowing two days for the movement, two days at each end for loading and unloading, makes a total of six days, which, divided into the average haul of 138 miles, produces an average mileage of 23 miles per day. This does not take into account the large number of cars that are

necessarily bad order and undergoing repairs, nor does it take into account the number of cars that must be accumulated in advance to take care of a seasonable movement. There are very few large freight movements in the United States that are not seasonable. In other words, to move a large fruit crop, very often 1,000 to 5,000 fruit cars must be assembled on each road in advance of the movement. The same can be said in connection with the movement of a large grain or cotton crop.

On roads serving a large coal producing territory, in order to run the mines full time, it is necessary to have a one or two days' accumulated supply of coal cars available. If this is not done, it is impossible to run the mines full time. There will be various conditions on a large system that will interfere with the free movement of empties from the point where they are made empty to the mine territory. If the mines do not have a day's supply on hand, an accident blocking the track for a few hours or severe weather slowing up the movement would prevent the mines from running full time. I merely mention these facts, because a large number of cars must be accumulated in advance for these different movements, and these accumulations in advance produce a low average mileage for the month's or year's performance.

THE OPERATING OFFICER'S DILEMMA

I wonder if those who insist on high average car mileage figures realize that there are two things that cannot be done at the same time; first, make a high average car mileage per day, and, second, furnish the shipper the kind of car he wants the day he wants it from an accumulated surplus. If you are making a high average mileage you are short of cars and are moving them quickly without any congestion, and if you furnish a shipper a car of the kind he wants on the day he wants it you have such a large surplus of cars on your road that it precludes the possibility of making a high average mileage performance. There are two things confronting an operating officer having the responsibility for furnishing of freight car equipment: One is to furnish the patrons of the road a car or a number of cars promptly as they order them; the other is to make a fancy average car mileage per day figure, and usually the operating officer elects to serve his patrons and furnish the cars when the patrons want them, and in doing this he is automatically prevented from making high average car miles per day.

I conclude, not from statistics, but from observation of the roads of the conditions on which I have a knowledge, that there is not so much an actual shortage of freight cars in the country as there is a shortage of power, terminal tracks, passing tracks and other facilities with which and on which to handle cars, and a great percentage of cars in bad order due to the fact that we have in use today a great many of the earlier wooden cars of weak construction that will not stand the strain and in consequence are in bad order a large portion of the time, and that some of the earlier steel cars are not heavy enough to stand the strain of present-day heavy service. It would be far better, instead of building new cars, to provide the facilities with which to move with rapidity and dispatch the cars that we do have, and to re-inforce and strengthen the weak cars that are now in existence to a point where they would perform as much relative service as the modern strongly constructed freight cars.

MEANS FOR INCREASING CAR MOVEMENT

There are many ways in which the average car movement can be improved under present conditions. To explain in detail how this can be done would take considerable space, but the following essentials can be briefly stated:

(1) A reasonably accurate telegraph car report showing the loaded and empty car situation on which to base an intelligent distribution.

(2) A reasonably accurate telegraph yard situation report, showing the loaded and empty cars at each terminal and at each of the principal loading stations where loads and empties accumulate awaiting movement and showing separately the loads over 24 hours old.

If on a large railroad there are no loads on the 7 a. m. yard report on hand 24 hours awaiting movement, it can generally be accepted that the freight movement on that railroad is 100 per cent., because in the natural handling of the business and handling it promptly there are times when loads will become 24 hours old awaiting movement, and if a large business can be handled without any loads becoming 24 hours old awaiting movement it can generally be accepted that the loaded movement is good. This coupled with the fact that few loads are reported on hand at any terminal awaiting movement will prove conclusively that the loaded movement is good.

(3) A competent force of traveling car agents or inspectors (whatever they may be called), to check up and systematize the handling of car reports, and to report to the responsible officer the delays in handling loaded and empty cars that cannot be located on any report but must be detected by the man on the ground. We cannot take a delay developed in the car accountant's office and criticize anyone. We must first find out from the man on the ground the cause of the delay; it may have been due to conditions beyond his control, or it may be an error in the car reports, but if a traveling inspector goes to a station, finds cars delayed and analyzes the causes of delays, the officer to whom he reports can handle quickly specific cases with the responsible employees, and one specific case handled quickly accomplishes more than a hundred generalities or a specific case handled weeks or months after it arose. In other words, the force or effect of the handling of the delays depends upon the shortness of the period that elapses between the delays and the time the superintendent calls on the employees at fault for explanations.

(4) Bad order cars should be repaired at a time when cars are plentiful, which is always a time when business is dull. Too many wait until the cars are required and business is good before the work of repairing is started. Unfortunately, however, there are many railroads that are poverty stricken and cannot make repairs until business is good and they are actually taking in the money with which to pay for the material and labor. Further, when business picks up in the harvest season, and the road is willing to expend the money, it often cannot get the needed labor, which means it is difficult to improve the bad order situation.

(5) Shippers should be asked to co-operate and load and unload cars with more dispatch and to load the cars more nearly to carrying capacity, not by generalities, circulars or newspaper articles, but by going to the shipper's place of business, telling him of the situation, talking to him of his own shortage and necessities and giving him some concrete suggestions that will apply to his particular business. This can best be done by the agents, traveling supervisors, assistant superintendents, superintendents, or other operating officers, and the traffic department representatives, but usually more can be accomplished in this direction by an agent or operating officer.

(6) Reduce the number of imaginary executives on a railroad and increase the number of working men. By this I mean, there are too many superintendents, assistant superintendents and train masters on a railroad who imagine that they are executives. If these men would ride local freight trains, analyze the delays to cars at each station, both on the part of the shippers and the railroad, and handle with the railroad employees the delays they are responsible for, and with shippers or receivers of freight the delays they are responsible for, and take the time to check the waybill cases at all points where loads are awaiting movement, and check the yards and methods of handling the yards, they could make a vast improvement.

"THE WAY TO MAKE CARS IS TO MOVE THEM"

Briefly, the way to get better movement on cars at a time when cars are required, is for the operating organization to make a vigorous campaign on the handling of loaded and empty cars. If an empty car or a loaded car can be advanced one day or one mile it has the same effect on the total movement, assuming of course that the empty movement is an intelligent one. There are many ways in which the movement can be increased: Shippers will order more cars than they can load in one day. During a time of car shortage when a shipper does not commence loading a car the day it is placed for loading, if placed by 1 p. m., the car should be taken away from him and given to some other shipper at that station or at some other station who will load it. Even if a shipper is entitled by law to hold a car and pay a legal demurrage rate, it is unfair to the man who is willing and anxious to load his freight to permit somebody else to detain the car, or you might say, keep it out of circulation by paying demurrage. Railroads do not of course want the demurrage earnings, they much prefer to have the legitimate earnings of the cars in service. Not only do not the earnings from demurrage not compensate them for the use of cars, but when cars are on demurrage it means that the facilities the railways have provided for current handling of business are being used as storage tracks, and other shippers are being deprived of facilities they are rightfully entitled to.

In conclusion, the way to *make* freight cars is to *move* them.

DEFECTIVE CAR CARD

The central safety committee of the St. Louis & San Francisco has recently issued defective car cards, as shown in the illustration, for the use of trainmen, switchmen, and all employees of the company who are interested in preventing injuries that might result from the defects in the appliances on cars. These cards may be used for either freight or passenger equip-

DEFECTIVE CAR CARD			
Car Initial _____	No. _____	Train _____	Division _____
<input type="checkbox"/> Air Brake (Specify Defect) _____			
<input type="checkbox"/> Not Journal <input type="checkbox"/> Ladder <input type="checkbox"/> Hand Holds <input type="checkbox"/> Coupler <input type="checkbox"/> Grab Irons	<input type="checkbox"/> Side Doors <input type="checkbox"/> Wheel Flange Brkn. <input type="checkbox"/> Running Boards <input type="checkbox"/> Pin Lifter <input type="checkbox"/> Truck	<input type="checkbox"/> Steam Heat <input type="checkbox"/> Lights <input type="checkbox"/> Toilets <input type="checkbox"/> Seats <input type="checkbox"/> Windows	Interior Defects
Other Defect _____			
Date _____ 191_____			
Trainman or Switchman _____			

Card Used for Indicating Defective Cars on the Frisco

ment, and cover inside defects as well as outside. The following instructions are printed on the back of the card:

When defective conditions are observed on passenger or freight cars in your train, note the defects as provided on the other side of this card by placing an X in the square before the name of the defect. If exterior defect, attach card to truss rod or other prominent place on side of car; if interior defect, to signal cord, so that it will be seen by inspectors.

Date Repaired.....191.....

Signature Foreman making repairs.
Master mechanic will, at the end of each week, forward cards to superintendent, who will make a book record of them under name of man making cards, and at the end of each month forward to the chairman, Central Safety Committee, St. Louis, Mo.

These cards are to be distributed to the trainmen and switchmen, and are to be placed in cabooses, switch shanties and other places where they will be easily accessible. The safety committee men are also given a large supply and instructed to do everything in their power to encourage the use of the cards. A similar card has been in use on the Chicago & North Western for the past year and a half, but it is not handled by the "Safety First" committees.

Steel Underframe Cars for the Grand Trunk

New Steel Frame Inside Sheathed Box Cars and Steel Underframe Automobile Cars Received by This Road

With the introduction of the steel frame, inside sheathed box car, doubts were expressed by many car department officers as to the ultimate success of this design. It has been thought by many that the horizontal sheathing cannot be made entirely waterproof, and a number of other objections have been urged against this type. The Canadian Pacific, the road which has

The outside steel frame has proved very popular and is now in use on freight equipment on a number of important rail-ways, among these being the Grand Trunk, which has recently received 2,000 cars of 60,000 lbs. capacity from the Pressed Steel Car Company.

The center sills are 15 in., 33 lb. channels and the side sills



Steel Frame, Inside Sheathed Box Car for the Grand Trunk

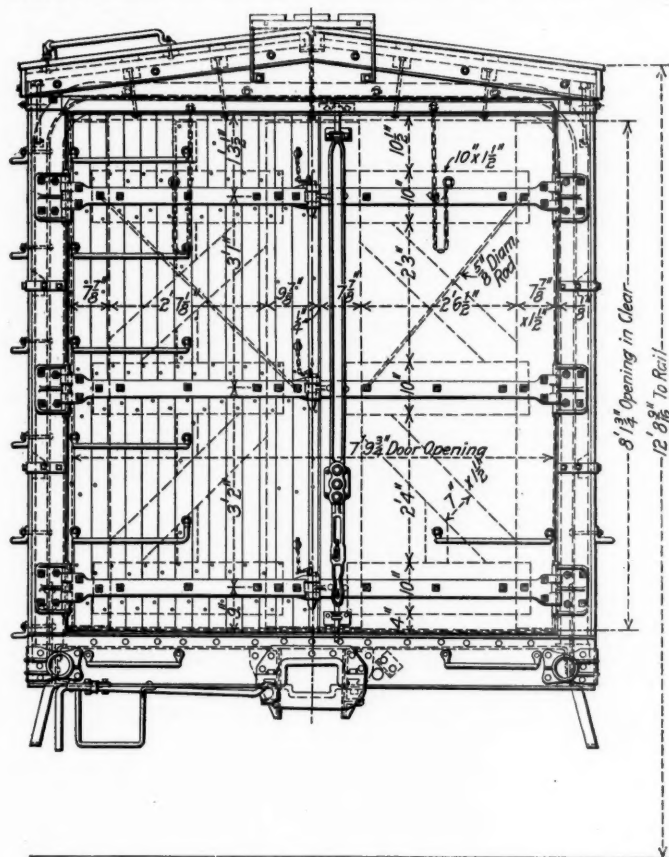
done most to develop this car, has now some 30,000 in regular service. Very little difficulty has been experienced, and that with the sheathing has been entirely eliminated by carefully selecting and drying the lumber.

8 in., 11¼ lb. channels, all extending from end sill to end sill. The end sills are 10 in., 15 lb. channels and are connected to the side sills by means of gusset plates and pressed steel push pockets. The body bolsters are built integral with the under-



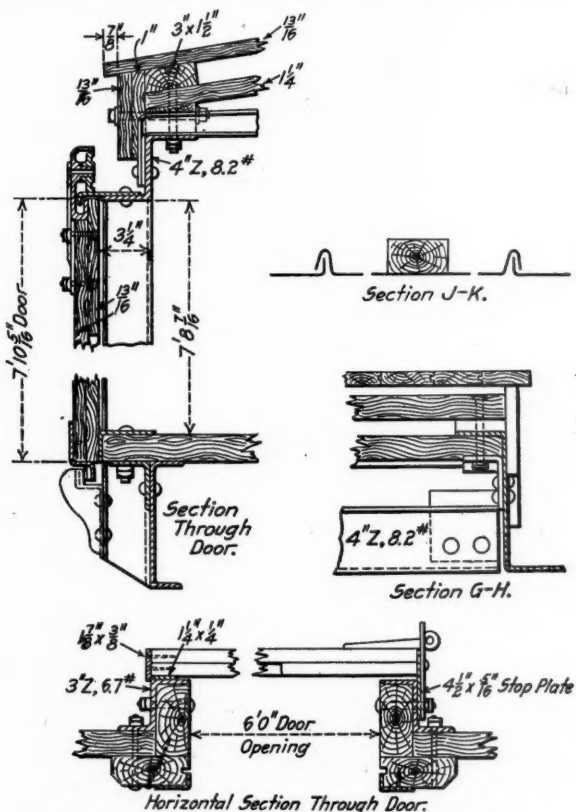
Steel Underframe Automobile Car for the Grand Trunk

frame and consist of four pressed steel diaphragms and a center brace, reinforced at the top and bottom with 15 in. x $\frac{3}{8}$ in. cover



End Door Arrangement of the Grand Trunk Automobile Car

plates. Two cross bearers are used, made of pressed steel diaphragms, with top and bottom cover plates, and there are three shallow diaphragms made of 5 in., 6½ lb. channels.



Framing Details of the Steel Frame Box Car

The side posts and braces are 3 in., 6.7 lb. Z-bars and the end posts are 4 in., 8.2 lb. Z-bars. Following recent practice, the diagonal braces are omitted from the side framing at the ends of the car, and there are also no diagonal braces in the end frames. The floor is of yellow pine $1\frac{3}{4}$ in. thick, resting directly on the side sills and bolted to intermediate Z-bar stringers, and supported at the center by yellow pine stringers resting on the center sills. The side sheathing or lining is $1\frac{1}{2}$ in. tongue and grooved yellow pine, fastened in place by $\frac{1}{2}$ -in. bolts; the end lining is of $1\frac{3}{4}$ in. yellow pine. An inside metal roof is used. The trucks are of the arch bar type with $4\frac{1}{4}$ in. x 8 in. journals. The general arrangement and the more important details of the framing are shown in the accompanying engravings.

The Grand Trunk has also recently received 250 steel under-frame automobile cars of 60,000 lb. capacity from the Western Steel Car & Foundry Company. The steel underframes of these cars are of structural steel, except for the bolster and cross bearer diaphragms which are pressed steel. The end construction of these cars is shown in one of the illustrations. A vertically operated locking device is used on the large end doors. The roof is of the inside metal type.

The general dimensions of the cars are as follows:

Box.	
Length inside	36 ft. 0 in.
Width inside	8 ft. 6½ in.
Height from floor to carlines	8 ft. ½ in.
Width of door opening	6 ft. 0 in.
Height of door opening	7 ft. 7¾ in.
Length over end sills	37 ft. 4¾ in.
Width over side sills	8 ft. 9½ in.
Width over eaves	9 ft. 3¾ in.
Height from rail to top of floor	4 ft. 2¾ in.
Height from rail to roof at eaves	12 ft. 7¾ in.
Height from rail to top of running boards	13 ft. 5 in.
Weight of car body	23,000 lbs.
Weight of two trucks	12,300 lbs.
Total light weight	35,300 lbs.

AUTOMOBILE.	
Length over striking plate	41 ft. 8 in.
Length over running boards	42 ft. ¾ in.
Length inside	40 ft. 0 in.
Height from floor to carline	8 ft. 6 in.
Height from top of rail to top of floor	3 ft. 8 in.
Height from top of rail to eaves	12 ft. 8 9/16 in.
Height from top of rail to top of running board	13 ft. 6 in.
Height of side door opening in clear	8 ft. 1¾ in.
Width of side door opening	9 ft. 0 in.
Width inside of body	8 ft. 6½ in.
Width over eaves	9 ft. 6 in.
Width over side sills	9 ft. ¾ in.
Center to center of trucks	30 ft. 6 in.
Height of end door opening in clear	8 ft. 1¾ in.
Width of end door opening in clear	7 ft. 9¾ in.

MODIFICATION OF I. C. C. QUESTIONS

The questions sent out by the Interstate Commerce Commission in the rate advance investigation have been modified as follows:

Where carriers can more readily furnish desired information by systems than by roads they should so indicate to the commission by wire, requesting authority to make the returns by systems, and indicating the particular questions with reference to which the information is desired to be so given. Where returns are made by systems instead of roads, the returns for each road in the system should clearly indicate where the returns, with respect to each question, may be found.

In order that the returns from the carriers may correspond as to period with the periods covered by annual reports to the commission, it is desirable that the returns be made for fiscal years ending June 30, as stated in the circular. In case carriers desire to make their returns for calendar years instead of fiscal years, they should apply to the commission by wire for permission to do so, stating the reasons and specifying the questions with reference to which the modification is desired.

Question No. 6.—The purpose of this question is to illustrate the application of rates to the transportation of the selected commodities. The points of origin, points of destination, and routes to be chosen should be such as will fairly represent the movement of each of the commodities on the railroad of the respondent. In respect to some of the commodities the movement over two routes or from two points of origin to two points of desti-

nation may be sufficient to be representative, while in case of other commodities it may be necessary to select a greater number of points of origin, points of destination, and routes to make a fair presentation. In submitting the preliminary statement of points of origin, points of destination, and routes, the carrier should submit a sufficient number to meet the above requirements.

The returns in column headed "Minimum weight of lading per car prescribed by tariff" on forms Nos. 1, 2, 3, 4, 5, 6, 7 and 8 should be the minimum weight prescribed for cars most used in the transportation of each of the selected commodities covered by the returns. In other words, the minimum weight of lading per car that will approximately represent the application of published tariff rates, rules and regulations to the movement of the traffic should be given for the purpose of comparison with the "average load per car" in the statements to be submitted. It is believed that, generally, the minimum will be that prescribed by the official classification or by special tariffs, except when based upon the capacity of the car, in which case the minimum will be that prescribed for the cars most used.

In stating the empty-car movement required to be returned on forms Nos. 1, 2, 3 and 4, it is left to the respondent company to approximate the empty movement incident to the transportation of each of the commodities named in question No. 6. The basis for such approximation or the method used in arriving at figures submitted should be stated. It is further desired that an analysis be made with respect to each commodity, showing as nearly as possible the proportion of tonnage carried in (a) respondent's cars, (b) in cars owned by foreign roads, and (c) in privately owned cars, and the empty mileage of cars of each ownership. If practicable, this information should be given under "general remarks" on the forms referred to.

Where a clearing house is maintained for the handling of through-freight waybills, such as the Star Union Line, etc., carriers may show statistics for a system as a whole.

The "allowances and deductions" reported should be those provided by tariff, and are to be stated whether shown on the billing or not. Under "kind of car" general classes only are to be shown.

In making returns for movement of coal it should be understood that run-of-mine and other grades of coal are to be treated alike, provided they take the same rates.

Question 7.—The analysis of absorptions, as required by this question, should commence with the month of July, 1912, and should proceed for each consecutive month of the fiscal year ending June 30, 1913, or for such less period as may be determined by the commission. Upon completion of the analysis for the month of July, 1912, the carrier should report to the commission the time and force required for that work.

In reporting under this question the instructions should be literally construed and the returns should cover the payments as taken into the carrier's accounts for the period under review, without regard to the date of the traffic movement or the particular commodities or shipments involved.

Question No. 9.—It is desired to get a report of the movements for loading or unloading, wholly or partially, on all privately owned tracks, and tracks owned or controlled by the carrier, that are used exclusively to accommodate the traffic of a particular shipper or shippers. In the case of industries not performing their own switching, the length of the movement to be reported is that from the switch connection of the private track with the tracks of the carrier to the end of the siding, where such distance approximately represents the distance to point of placement. Where this is not a fair approximation, actual distance should be given. In the case of industries doing their own switching, the distance reported should be from the point where the switch track leaves the main running tracks of the carrier to the interchange track with the industry.

Question No. 10.—The requirements under this question are modified as follows: Before submitting copies of contracts, etc., the carriers should furnish the commission a list of the contracts covering equipment purchased, for the specified period, giving

names of vendors, date, and amount and kind of equipment covered. Upon receipt of this list the commission will indicate the contracts and other additional data required.

Questions Nos. 11 and 12.—Before submitting copies of contracts, agreements, and specifications required by these questions, the carrier should submit lists of the contracts, formal and informal, under which material was purchased, with kind of material and names and addresses of vendors. The commission will then indicate the items with respect to which contracts or specifications are to be furnished.

Question No. 37.—Before furnishing copies of contracts, as required by this question, the carrier should submit lists of such contracts, formal and informal, giving the names of contracting parties and a description of the facilities constructed or renewed, and the commission will then indicate the additional data required.

Question No. 39.—The requirements under this question are so modified as to require only the movements of the cars and a statement as to the mileage, empty or under load, with respect to each movement. The nature and amount of the loading may be omitted.

Question No. 70.—In reporting the mileage represented by trip passes (Table B) the returns may be made with respect to passes honored rather than passes issued, where such method is preferred by the carrier. The returns should indicate which method is used.

Question No. 72.—The returns under question No. 72 may, at the option of the carrier, cover the period July 1, 1907, to June 30, 1913, instead of July, 1898, to June, 1913.

Question No. 76.—Unless further advised by the commission the returns under this question should cover only the full report of "other expenses" for the period July 1, 1912, to December 1, 1913, with monthly totals of amounts charged to accounts entitled "other expenses" for the period July 1, 1907, to June 30, 1912.

Question No. 77.—Unless further advised by the commission, the information covered by this question should be furnished only for the period July 1, 1912, to December 1, 1913.

Question No. 78.—Unless further advised by the commission, the information covered by this question should be furnished only for the period July 1, 1912, to date of filing response.

NEW RAILWAY CONSTRUCTION IN URUGUAY.—It is reported that the government of Uruguay has recently signed a contract with a representative of the Uruguay Railway, a company organized under the laws of the state of Maine and a subsidiary corporation of the European Farquhar Syndicate, for the construction of three lines of railway, as follows: A line 205 miles in length from Montevideo to Carmen in the department of Durazno, and thence to a point where junction will be made with the Midland; a line a few miles long to connect the East Coast of Uruguay Railway at Olmos with the above mentioned line to Carmen; a line from San Carlos to Rocha, 50 miles long. The government is to pay the cost price of the construction, plus a profit of 10 per cent., paying in bonds of the foreign debt bearing 5 per cent. interest. The Uruguay railway, for its part, agrees to build not less than 31 miles of track every nine months, and the line between San Carlos and Rocha is to be built first. The state agrees to buy from the railway the line now under construction from Rocha to Paloma. The concession now held by the Uruguay for a railway line from Rocha to Treinta y Tres, is to be cancelled. The preference, of course, will be given by the state to the company for the operation of the railroads when they are completed. The Farquhar Syndicate, besides controlling the Uruguay Railway, also controls the Midland system in the northwestern part of Uruguay and reaches down as far south as Santa Isabel in the department of Durazno and the East Coast of Uruguay Railway from Olmos to San Carlos. The lines provided for in this contract will give to the Midland system an independent connection with Montevideo and establish a route along the coast from Montevideo to Paloma.

LORD STRATHCONA

Lord Strathcona and Mount Royal, High Commissioner for Canada, who on November 7, 1885, drove the last spike into a tie that completed the Canadian Pacific from the Atlantic to the Pacific, died early Wednesday morning in London, England. His death was due to prostration following a severe attack of catarrh.

On being asked by the *Railway Age Gazette* to give an appreciation of the late Lord Strathcona, Sir Thomas Shaughnessy, president of the Canadian Pacific Railway, said: "Lord Strathcona was not an initiator of enterprise, because he did not have that kind of mind, but once he became financially interested in an undertaking he rarely let go. The large part of his fortune was acquired in connection with the St. Paul, Minneapolis & Manitoba railway, which afterwards became the Great Northern, where he had as associates J. J. Hill, Lord Mount Stephen, John S. Kennedy and Commodore Kittson. While some of the others reduced their holdings of this stock from time to time, I think that Lord Strathcona has been for a considerable period the second largest if not the largest, holder of the shares. The reorganization of the Northern Pacific and the interest taken in that property by those connected with the Great Northern yielded him another very large profit. In comparison with his interest in these enterprises, his holding of Canadian Pacific shares was comparatively trivial; for instance in 1901 he was the registered owner of only 5,000 shares, but, of course, this amount has been substantially increased since then by his pro rata participation as a shareholder in new issues.

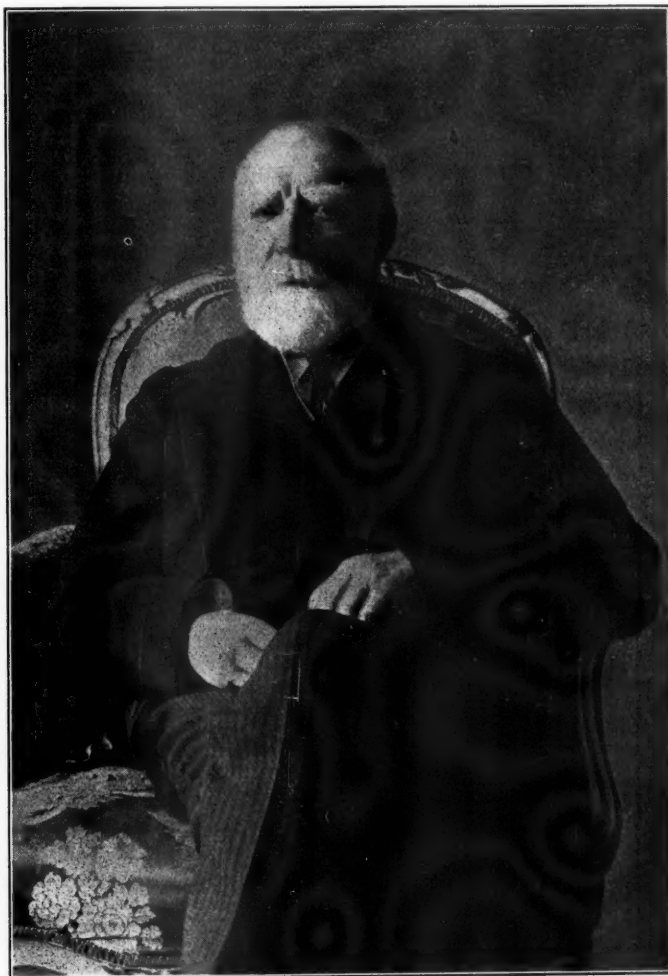
"In the trying days of the Canadian Pacific he was a tower of strength to Lord Mount Stephen, then Mr. George Stephen, and quite prepared when the emergency arose to risk with Mr. Stephen a very large percentage of his entire fortune to save the company from disaster. Although he was a director and a member of the executive committee of the company, he had not, for sixteen or seventeen years, attended a meeting of the board or taken any active interest in the company's affairs. He was a large and willing contributor to educational, church and charitable works in Canada and Great Britain. McGill University was a beneficiary of a large amount. The Royal Victoria College for women was almost, if not entirely, his creation and the Royal Victoria Hospital will be a lasting monument to the generosity of Lord Strathcona and his associate in the work, Lord Mount Stephen.

"He was the soul of hospitality, loved to have people about him as his guests, spared no effort or expense to contribute to their comfort and pleasure and in his dealings with his fellow men he was a model of courteous consideration. He never forgot his old friends, and while the fact was seldom in evidence he had the highland faculty of remembering those who had given him cause for resentment. For many years he has been an outstanding character in the history and the life of Canada.

He was indeed a grand old man, and his death has created a void that will not be filled in many years."

Donald Alexander Smith, who in 1887 was given the title of Lord Strathcona and Mount Royal, was born in 1820 at Archieston, Morayshire, Scotland. He was the son of poor parents and went to Canada as a Hudson Bay Company apprentice when he was 18. That was while Van Buren was president of the United States. He rose slowly until 1868 when he was appointed chief factor, and in 1868 was made the Canadian head of the company and moved from the outlying fort, where he had been stationed, to Montreal. Thus he was 48 when he returned to what might be called civilization. It was largely through his reputation for honesty and his exercise of good judgment that the vast Canadian northwest, which had been under the government of the Hudson Bay Company, was transferred to the government of the Dominion of Canada, without serious trouble.

It was not long after this transfer that he became associated with James J. Hill. It is generally supposed that he entered Canadian politics largely for the purpose of pushing through the project of the building of the Canadian Pacific. He entered the Dominion House of Commons in 1871 and fought consistently in support of this great project. By 1885 the project was complete.



Lord Strathcona

THE LONDON-PARIS SERVICE.

—Despite the recent improvements in the service between London and Paris, that service is still far from perfect. One of the most irritating sources of delay is the customs examination of passengers' baggage, which causes an excessive amount of time to elapse between the arrival of the steamer and the departure of the boat train, especially on the French side. Several years ago the British customs authorities announced their willingness to send a number of officers to Paris in order to test a system of examination at the point of departure, a scheme to which the Northern Railway of France had agreed to offer the necessary facilities. Nothing, however, was done. The reason probably lies in the fact

that three ministries have their say in the matter. The Minister of Public Works is interested because the railways are under his control, the Minister of Foreign Affairs because the scheme also involves negotiations with a foreign government, and the Minister of Finance because he has authority over the customs. The idea has thus probably got lost amid a mass of red tape. If it were pushed more the objection would probably be raised by every official asked to report on the scheme, that the English officers would have no legal competence in case of attempted fraud. Germany has for years maintained a customs depot on Swiss territory at Basle, and German officialdom is hardly likely to countenance a system calculated to open the door to fraud. As it is now, the constant endeavors to improve the service, made by the railroads on both sides of the channel, are severely handicapped by delays caused by the customs regulations.

Should Commerce Commission Initiate Rates?

The Commission Should Initiate Rates. Stability and Uniformity are More to Be Desired than Elasticity

By CHARLES A. PROUTY

Interstate Commerce Commissioner

Transportation consists in the moving of articles from one place to another. Just as everything which enters into the physical life of man comes from the earth, so it may possibly have occurred to you that the only power which man has over nature is the power of moving things.

Just follow down the process of cultivation: you can move your plow or your harrow through the ground. If you live in a country where it is necessary to fertilize, owing to the poverty of the soil, you can move the fertilizer on to the earth. You move the seed of corn into the ground; you move the cultivator between the rows. The only power which man has exercised is the power of moving things.

That industry which embraces the greatest amount of capital, whose production is of the first importance, is agriculture. Next to agriculture in the amount of capital involved, and in the importance of the product, is probably transportation by rail.

There are, of course, a great many kinds of transportation other than transportation by rail, and I have sometimes felt that we perhaps ought to get at these other kinds of transportation. I had occasion the other day to send a couple of barrels of potatoes from my home up in Vermont, where we raise potatoes fit to eat, down to Washington, where you cannot buy potatoes fit to eat. The railroad company charged me \$1.45 for carrying those barrels of potatoes about 600 miles, and the truckman, who carried them the mile and a half from the station to my house, charged me a dollar. If the transportation charges enter into the high cost of living, we want to look, I think, somewhere else rather than to the transportation charges of our railroads.

Now, gentlemen, it is not at all certain but that the future great advances will be made, not in transportation by rail but in other forms of transportation. There is probably no country in the world where the railroad has been as aggressive as it has been in the United States. Our railroads have insisted on doing all the business. They have driven the boats out of the water, except in some few instances. I am inclined to think that in the future the boat will play a much larger part in the carriage of commodities. Trolley lines will also be an important factor. The trackless trolley system which takes the motive power from the overhead trolley is likely to become an important feature in our transportation system. Up in southern New England, where the roads are good and population is dense, the automobile already competes with the railroad in the transportation of freight up to distances of from 15 to 20 miles.

However, the railroads will still be the main avenue and means of transportation, covering substantially the same ground which the railroads cover today, and we shall have for all time with us the railroad problem.

Now, it may not be inappropriate upon an occasion of this kind if I should address to you gentlemen a single thought in the development of that problem for your consideration. Your president has said to you that I am a member of the Interstate Commerce Commission. That is true. I did not expect to be, but I am. It was arranged some time ago that I was to resign, and I expected that my resignation would have been accepted as long ago as the first of November. If I had known I was to be a commissioner still, and as busy as I am, I do not know that I could have agreed to come here, although it has not—although it ought to have—involved some preparation on my part.

What I say to you this afternoon, therefore, is not said as an interstate commerce commissioner. It does not express the view of the Interstate Commerce Commission, as far as I know. It may, or it may not. I do not even say it as a commissioner myself, but I simply say it to you as individuals.

*Abstract of address before Traffic Club of Chicago on January 16, 1914.

Something like a year ago it occurred to me that I would like to know how many tariff changes were made in the tariffs filed with the Interstate Commerce Commission, so I asked the chief of our tariff bureau to examine his files and tell me how many changes were made in freight schedules, passenger schedules and express schedules, for 10 days. The period covered was the 10 days from October 22, 1912. No attempt was made to magnify the number of changes. Where the change was to a group, although the number of changes would be very great, the change was simply counted as a single change. For example, if the rate was changed from Chicago to Texas common points, that would be one. If a rate was changed in transcontinental tariffs, while a very great many points would be affected, the change was only counted as one. A change in classification would affect an infinity of rates almost, but it was only counted as one change.

Now, then, reckoning changes in that way, in this period of 10 days in freight schedules—I am quoting from memory and it may not be absolutely exact, but it is substantially right—there were 15,000 advances and 29,000 reductions. In the passenger tariffs there were 60,000 advances and about 86,000 reductions. In express tariffs there were 4,000 advances and 32,000 reductions.

Now, then, computing the number of changes in passenger tariffs, it was manifestly necessary to do what we did not do with freight tariffs—we had to consider every particular point and treat every change to any point as one. The carriers at that time were engaged in revising their passenger schedules, so as to conform to the fourth section, which accounts for a great many of these changes. The express companies were getting ready to bring themselves into line with our express order. So I think that we might fairly disregard passenger and express tariffs, but there was nothing abnormal about the freight tariffs, and you may accept it as a fact that from one year's end to the other there are every 10 days approximately 15,000 advances and 29,000 reductions in freight schedules.

I have always known that there were a good many, but that rather took away my breath, and so I selected three railroad systems, one in each part of the country, whose traffic managers I happened to know. I wrote each one a letter in which I stated the result, and told him how many of these changes had originated on his system, and asked him two questions. The first question was: "In your opinion, are these changes, either advances or reductions, of general benefit to the shipping public or to the railways?" The second question was: "In your opinion, has the time come when no tariff change should be permitted, either up or down, without the consent of the federal commission?"

Now, all these gentlemen answered the first question by saying that, in their opinion, the changes in question had not been of material benefit either to the shippers or to the railroad. One of them said that, in his opinion, the time had come when no change should be permitted in either direction without the consent of the commission. On that question the other two were non-committal.

The suggestion which I want to make for your consideration is this—and it was embodied in my first question to these traffic representatives: Hasn't the time come when no tariff change should be permitted without the consent of the commission first obtained? Or, to put it another way, has not the time come when the Interstate Commerce Commission should be given the same authority in the making of rates which is given to many, and perhaps most, state commissions?

I am not going to enter into any argument of this question. I just want to suggest to you one or two reasons, which in my own mind incline to an affirmative answer to that question.

This railroad problem of ours is manifestly a thing of development. When the United States, a third of a century ago, became conscious of the fact that its railroads must be regulated, it was absolutely without any precedent for that regulation. There were countries which owned and operated their railroads. There was no country where the railroads were financed by private capital and regulated officially by public authority.

Necessarily, this problem has been one of gradual development, and what seems to be perfectly evident today may be just as evident the other way tomorrow. There could not be any better evidence of that than the fact that a dozen years ago I myself wrote an article on this same subject, in which I arrived at exactly the contrary conclusion that I have now. Now, at that time and in that article I gave three reasons for my conclusion, and perhaps I cannot do any better than state to you what those reasons were.

The first reason was this: That the carriers should be given the power to initiate their own rates in order that we might have an elastic system of rates. I became a commissioner, and first had to do with these questions, 17 years ago. At that time the phrase "elasticity of rates" was very much in the mouths of all people who discussed this subject. Railroad men talked about the elasticity of rates, and shippers talked about the elasticity of rates, and economists did. The economists rather agreed that we ought to have elasticity of rates, and I thought so, too. It seemed to me that there ought to be the same possibility to vary the price of transportation which existed as to all other commodities.

I may say, as a rather curious thing, that I believe it was at my suggestion that there was put into the act to regulate commerce, that provision that the order of the commission shall expire after two years, in order that the rates of the country might not become one inelastic body. But the observation of the last seven or eight years has changed my opinion in that respect. I have come to the conclusion that stability is of vastly more importance than elasticity, and that what the shippers of this country want is to know absolutely the rate upon which they can depend, upon which their business is to be transacted, and upon which their contracts are to be made.

There must, of course, be changes in railroad rates. There are some rates which the gradual process of time makes wrong. There are other rates which should be put in for an emergency. There are other rates which should be periodically changed. There will be continual occasion to change classification rules regarding containers, and all that sort of thing. That question ought to be provided for. But the great mass of our rates, the great mass of the rules under which the traffic of this country moves, ought, in my judgment, to be the same year after year.

Some time ago I became acquainted on the train with a gentleman from New Zealand, who had something to do with the railroads of that country, and he volunteered to send me the railroad tariffs of that country. I was a little astonished at the proposition when I remembered the rooms full of tariffs, the building full of tariffs, that we have at Washington, but I said I would like to see them, and would be glad to have him send them to me. Presently I got a little pamphlet of not over 30 or 40 pages, which contained all the rates and all the regulations under which the government railroads of that country are operated. I had occasion some time ago to investigate the rates of the German railroads, which are also operated by the government, and I found, to my surprise, that those rates were contained in a comparatively small volume.

Of course, the fact that we have competing railroads, the fact that there are different lines of railroads, renders it impossible to do in this country what has been done in New Zealand or in Germany, but it is possible to very much simplify the schedules which are published, and it is possible to have a stable and unvarying rate.

What made those variations? Elasticity, my friends, means preference. It means that somebody somewhere has been able to convince some traffic man that he, or his locality, ought to

have a better rate. He gets that better rate, and that rate makes a change which runs like a river all over this country from the Canadian line to Mexico. The change has not benefited anybody.

My second reason was this: The railroads of this country are owned by private capital. They are devoted to a public use. The government, therefore, has a right to regulate them. It does so, whether it has any right or not. But, while the government must regulate and should regulate these railroads, it ought to leave the private capital invested just as free as it can be left, consistently with the public interest. In other words, the railroads should have a right to make any rate they see fit, and should have a right to maintain that rate until it has been shown by a full hearing that the rate is wrong. There is no answer to that argument; that is absolutely true. It is true of rates, and it is true of everything else which a railroad does.

We ought to interfere in the least possible degree with the activities of that private property. But, gentlemen, the railroads of this country do not make their rates. It has come to that pass where the right to initiate a railroad rate is of no consequence to a railroad. The rates of a railroad are made by its competitors, by its shippers, by the state commissions, by the federal commission, by a variety of circumstances and conditions over which the traffic man has no control.

Nothing better illustrates the absolute truth of the statement that the power to initiate rates on the part of railroads is of no practical benefit, than the fact that railroads in official classification territory are today before the Interstate Commerce Commission asking to be allowed to advance their rates 5 per cent. They cannot even increase their rates 1 per cent. without the consent of governmental authority. Under those circumstances, it is idle to talk about its being a matter of any practical importance that you have the right to initiate your rates.

My third reason was that the public had a certain benefit from the competition in rates between the different carriers. That article was written 12 years ago. For the 5 years—yes, I will say the 20 years preceding that time—competition between railroads in rates had been a most important thing to the shippers of this country. The railroad rates of this country had been reduced by that competition as they would have been reduced by no other thing. But that, my friends, was because the rate when agreed upon by the railroads was not observed. Competition today is of no consequence. There can be no such thing as competition, so long as you must publish your charges and adhere to those charges.

There is competition in the rate between different forms of transportation. You can have competition between the ship and the railroad, and you can have it between the trolley and the railroad, but you cannot have competition in the rate, although you may in the service, which is of the greatest benefit. If competition in rates produces any effect, the effect is bad rather than good. The man who gets the benefit of that competition is the great shipper or the powerful locality which is not entitled to it. When the general level of rates is reduced to a point where it cannot be any further reduced—and that seems to be pretty nearly the condition in most parts of this country today—then competition that forces down the rates at one point has got to force the rate up at some other point.

So my belief is, that today competition in railroad rates is practically an impossibility, and certainly not a desirable thing.

It has been said, when I have suggested this idea to some people, that it would be physically impossible for the Interstate Commerce Commission to make the interstate rates of this country.

I am not going to argue that question, but, in my judgment, that is the only way that the commission ever can successfully regulate rates. It cannot be done under the present arrangement. I think it could be done at less expenditure, both of energy and of money, in that way than it could in any other. The Interstate Commerce Commission never can discharge the functions it ought to until it proceeds in some way different

from its present method. Today we hear a complaint and we make an order. Our regulation is, so to speak, regulation in spots. The order which we make in one case may create a discrimination in some other case. Until the Interstate Commerce Commission proceeds in some broad and comprehensive way, it never will come into its own.

The most difficult thing to be dealt with in this problem of regulation, as I see it, arises out of the dual situation of the state and the federal governments. I never had myself, any doubt about the outcome of the Minnesota rate case. The Supreme Court finally declared as the law, in that case, what everybody had understood to be the law for years, until some of my high-salaried friends who are working for the railroads exploited to the willing ears of a judge a different theory, and then that assumed a national importance.

The Shreveport case, which is now before the Supreme Court of the United States, involves an extremely doubtful question. That, to my mind, is the most important case in the matter of regulation that the Supreme Court has ever passed upon. Nobody knows what that decision will be, but it has always seemed to me that when a rate was once established by the supreme regulating authority, the states would be obliged to let that rate alone.

It is a very different thing to say that a rate is the voluntary rate of a railroad than to say that a rate is the rate established by the federal government. So, I think that if these rates were made by the federal government, the process would be simplified. It would curtail within reasonable and proper limits, and it ought not to stretch any farther the authority of state commissions, which today, in many cases, make not only the state rate, but the interstate rate. But that is not the principal reason, looking to that branch of our discussion.

When the Interstate Commerce Commission makes rates and classifications, those schedules and those classifications will occupy the same relation with respect to state rates and state classifications that the decisions of the Supreme Court of the United States do to the decisions of state courts. They will not be binding upon the states, but they will be precedents which the states will be inclined to follow. Not only that, but I feel that if the commission had the authority to make schedules and classifications, that it would result in conferences, in co-operation, between the state commission and the federal commission, to an extent otherwise impossible.

I have just seen a practical illustration of that up in my country, in New England. There the commissioners of four states sat down with a member of the Interstate Commerce Commission and agreed upon the local class rates which should be applied in those four states upon the lines of the Boston & Maine Railroad. I think that same thing would be done all over this country, and that it would presently produce out of the confusion and the discrimination and the absurdity of today a coherent system of rate making.

RAILWAY BRIDGES OVER THE DANUBE.—It is reported that a proposal of the Roumanian Government to come to an understanding on the choice of a suitable place for the construction of a bridge over the Danube has been favorably received in Bulgaria. Since Turkey has ceded a district on the Aegean Sea to Bulgaria, the government of the latter country has decided to construct a harbor at Porto Lagos, in Eastern Thrace, and a railway from that point northward into the Maritza Valley. This railway is to be the continuation of a line already in existence from the Maritza Valley through the Balkans to the Danube. By the construction of a bridge over the Danube connecting Rustchuk and Sistova, Roumania would obtain the advantage of more direct communication with the Mediterranean. Similar bridges have been recommended to connect the railway systems of Bulgaria and Servia, and those of Roumania and Servia. In the latter case it has recently been decided to build over the Danube at the village of Tziganesch, 19 miles above Gruia.

THE STEEL CAR SITUATION

The following is an abstract of a statement by Geo. A. Post, president of the Railway Business Association, before a subcommittee of the house committee on interstate and foreign commerce at Washington last week.

The Railway Business Association is composed of manufacturers, merchants and contractors dealing in goods consumed by railways. If Congress were to pass a law requiring the most rapid substitution possible of steel passenger train cars for wooden, the work would be done and the profit realized by us. Obviously we do not come before you on selfish grounds to obstruct steel car legislation. It is true that compulsory expenditures for that purpose might be so large that expenditures in other directions would be curtailed, and this would have an adverse effect upon those groups in our membership who supply the railways with facilities other than steel cars and the devices used on cars. Among us, for example, are institutions manufacturing and installing signal systems and other mechanical devices for the promotion of safety in train operation. We are confident, however, that Congress is fully as alert to the necessity for other safety measures as for the construction of passenger train cars. Hence, as a whole the group of manufacturers in whose behalf I am here, have nothing but immediate profit in view from a governmental impetus to the purchase of steel cars.

Exact and full knowledge of a highly technical subject is an advantage which commissioners are better situated to obtain than congressmen. A permanent commission can be made up of men having qualification for that special function and all giving all of their time to the work. They labor in close co-operation and when they act, each member may fairly be held accountable.

The Special Committee on the Relation of Railway Operation to Legislation has published returns from 225 companies covering a mileage of 219,000, indicating that the number of wooden passenger train cars in existence on January 1, 1913, was 46,926, or in round numbers, 47,000. The question has been asked whether cars on interstate lines and not subject to the act would not bring this figure materially down. We think it probably would not, because on June 30, 1911, 18 months previously, the total mileage engaged in interstate commerce was 244,000, and as new construction since 1907 has averaged about 3,500 miles a year, the total interstate mileage on January 1, 1913, may have been about 249,250; and of this mileage only 219,000 is included in the 1913 estimate of cars, leaving more than 30,000 miles of interstate roads not included in the roads reporting 47,000 wooden cars. It would seem as if the unreported cars on 30,000 miles of interstate roads, which would have to be replaced by steel under an act of Congress, would largely if not wholly offset the wooden cars not engaged in interstate traffic.

Upon the basis of 47,000 wooden cars at the beginning of 1913, let us see what the processes might be. The Interstate Commerce Commission on June 24, 1911, furnished a statement with regard to steel cars in which this sentence appears:

"It seems to us that the period within which all carriers subject to the act should be required to bring into conformity all their equipment of the kinds designated with the proposed act should be extended somewhat beyond that suggested in the bill, and perhaps ought to be not less than 10 years from the passage of the act." Careful study raises a question whether 10 years would be long enough if wooden cars not yet worn out are to be replaced. The preliminary figures of the commission for 1912, contained in the so-called press abstract, and covering substantially the roads in classes I and II, show 50,606 passenger train cars of all types and all construction. Adding to this figure the number reported in class III for 1911, or 879, we have an approximate figure for the total in 1912 of 51,485. Compared with 36,987 in 1902, the number of cars increased in the 10 year period ended 1912 about 39.1 per cent. Probably the increase during the next 10 years will be at a lower rate, since we may expect a decrease in the construction of new roads, which require passenger coaches traveling light, and concentration of the in-

crease in passenger traffic on established lines where it will to some extent be taken care of by increased car loading.

Suppose that instead of 39.1 per cent. the increase in number of passenger train cars in 10 years were to be only 25 per cent. At that rate of increase the number in 1914 would be 54,091, and the increase in 1924 over 1914, 13,522—an average annual increase of 1,352 cars in service. The average number of passenger train cars built has recently averaged about 3,200, as compiled for calendar years by the *Railway Age Gazette*. The average annual increase in the number of passenger cars in service since 1908 has been about 1,550. If you subtract the increase in the number of cars in service from the number of cars built you will have the average number scrapped annually, or about 1,650.

If 1,650 have already been scrapped in 1913, and no new wooden ones built, which is said to be the fact, the number of wooden cars January 1, 1914, is about 45,350, and if the law were passed this spring, say 44,550 at time of going into effect. To scrap and replace with steel cars 44,550 wooden cars in 10 years would require the building of 4,455 cars a year. Adding to this the cars built to take care of new business, estimated at 1,550 a year, we have about 6,000 as the needed annual car building capacity to complete the transformation in 10 years.

Now what is the actual capacity? It has been estimated at 5,000 steel passenger train cars a year if shops equipped to build freight cars were not diverted from their normal and necessary work. We judge that those who have made this estimate have stated what they believed the existing plants could turn out under experimental conditions. As practical business men we think it the part of prudence to base estimates rather upon what has actually been accomplished. Why depend upon producing 5,000 steel passenger train cars when there never has been a year in which 3,500 were produced? As already stated, the average has not exceeded 3,200 for the past several years. In 1913 the passenger train car builders have been behind in their orders and are so at the present moment, some of them several months behind. They have worked their plants as hard as conditions would permit. Yet in 1913 it is doubtful if actual returns of completed cars would exceed 3,200.

With a present capacity of 3,500 and a requirement of 6,000 it is evident that to do the work in 10 years would involve a capacity averaging 70 per cent. above that now existing throughout the whole period. We regard it as entirely uncertain whether capital would be attracted sufficient to provide so much new plant for this purpose. It seems to us that the only condition upon which capital would be induced to construct such additional capacity would be a strong assurance that the railroads would have the money for carrying through the whole project. Who can give such assurance? Nobody but the government, which controls the rates of transportation. That branch of the government which commands the expenditure should leave the time limit within which the outlay is to be made to be determined by that branch which has authority to permit adequate revenues for that purpose. If the Interstate Commerce Commission failed to allow sufficient earnings the command of Congress would be nullified. Investors in car building plants will form their own judgment as to whether such a governmental policy is likely to be continuous, and in reaching a conclusion on that point they will consider not only the attitude of public officials now in office, but broadly speaking the trend of popular opinion.

Consider now the cost. Representative Roberts has estimated that the average cost of steel passenger train cars of all types is about \$14,000. Our studies indicate that this is a fair figure. It has been computed that the total expense of replacing wooden cars with steel would be something more than \$600,000,000. This includes what the roads would spend voluntarily for replacement of cars retired from service. If we deduct from 44,550, the total number of wooden cars to be replaced in 10 years, those which would be normally scrapped, about 1,650 a year, or 16,500 for the whole period, we have 28,050 cars which would be retired under compulsion by this bill, and at \$14,000 a car this mandatory outlay would be \$392,700,000.

Maintenance of steel cars as compared with wooden is a matter of guess work. Repair and renewal of metal parts common to both types would probably cost more on steel than on wooden, because of the greater weight and severity of jarring. The higher rigidity of the steel car in rounding curves would also tend to faster mortality in wheels, trucks and buffing mechanism. Paint, a very large item, and roofing would be the same for steel as for wooden; lighting, heating and upholstery substantially the same. A large number of wooden cars will be in service throughout the early part of the period, requiring repair and renewal. It is to be hoped that the steel car will have a longer life, but you have in evidence an estimate that the average life of the wooden car may be about 15 years, and the benefit in this respect from a steel car will not begin to be effective until after it has been in service 15 years.

The best evidence on the subject is the actual experience. In 1909 came the great period of steel car construction. The Pennsylvania Railroad, which undoubtedly has progressed as rapidly as any system in the matter of installing steel cars, reports to the Interstate Commerce Commission a higher cost of maintenance per car now than five years ago. Between 1908 and 1912 the percentage of steel passenger train cars on that system as shown by its report to the Interstate Commerce Commission rose from 5.6 per cent to 32 per cent. In the same period the average cost of maintenance of passenger train cars per car rose from \$449 to \$579 a year, or 28.8 per cent. Undoubtedly this was due in large part to the rise in the cost of labor. But how can the railway managers know that labor cost will do otherwise than to continue to rise in the future as it has in the immediate past, especially as their labor cost must periodically be submitted to arbitration, which usually results in an award favorable to the artisans?

Assuming that maintenance remains relatively the same, we have \$392,700,000 as the amount which would have to be spent in the substitution of steel cars for wooden cars not yet worn out. If the transformation were to be attempted in 4 years, this would be about \$98,175,000 a year; even if done in 10 years it would be about \$39,170,000 a year. Let us see what effect this would have upon the ability of the railways to furnish facilities to the public. In 1911, the latest statistical year, the railways of the country after paying operating expenses, taxes and interest on funded indebtedness, had remaining a net corporate income of \$378,688,395. Adjustments, etc., through profit and loss gave a further income of \$74,634,509, or a total net income of \$453,322,904. The distinctively American policy has been to expend large sums from the income in each year for additions and betterments, without increase of capitalization. This is one reason why American railways have the lowest capitalization in the world.

In 1911, the appropriation from current income for additions and betterments aggregated \$58,740,315, for new lines and extensions, \$3,518,628, and for "other reserves," \$7,897,134. The amount carried to surplus was \$91,669,663. The total thus available but not used for increasing dividends or for beginning or resuming dividends on the 32 per cent. of the stock which paid none—the income, in other words, used or held for the public—was \$161,825,740. We are glad to note that one of the introducers of four-year bills has come to feel such a period too short; for this amount would have been cut down to \$63,650,743, or 60.6 per cent., if 1911 had had to pay its quota under a four-year bill; and even under a ten-year bill the year's quota would have been brought down from 161 million to 122 million, or 24.2 per cent., the amount of income available for but not distributed in dividends.

It should be emphasized, moreover, that this expenditure for steel cars would have to be met simultaneously with outlays for expensive safety measures other than steel cars if certain bills which are under consideration by your committee should be enacted. The same bill which requires the roads to spend in four years for steel cars the sum estimated at 371 millions would also compel every road to "adequately equip all of its

main railways or branches thereof with safety appliances in the way of signals, automatic switches and other devices, such as may be approved by the Interstate Commerce Commission." Bills are before you which would require, within four years, the installation of block signal systems, etc.

Business experience proves that the art of meeting a payroll consists in cultivating the apprehension that requirements are going to be larger than estimates and leaving a working margin for emergencies. We fear that the bills under consideration would commit Congress to the policy of making mandatory the expenditure of fabulous sums of money by the railways, leaving railway managers to obtain the money as best they may, and if they fail, to face the penalty of fine or imprisonment. Would it not be an anomalous situation for one branch of the government to say: "Thou shalt *spend*!" while a co-ordinate branch says: "Thou shalt not *earn*!" In such circumstances there would surely be another decree from another power. The investor: "Thou canst not *borrow*!"

We earnestly urge that if you enact a message compelling the railways to expend these vast sums you place upon the rate-regulating power the responsibility of determining the time-limit within which the work shall be completed and of permitting the carriers such revenues as may be necessary for its accomplishment. By so doing you will assure the people of the United States upon the word of its potent regulating body that safety in travel by rail will be promoted as rapidly as the financial resources of the railway companies will permit.

NEW YORK PUBLIC SERVICE COMMISSION

The Public Service Commission of New York State, Second district, sent its seventh annual report to the Legislature on Monday of this week. Since the failure of the attempt of Governor Sulzer, last summer, to appoint to the commission men not acceptable to the senate, this commission has had only four members. It now consists of M. S. Decker, chairman, J. E. Sague, C. N. Douglas and D. P. Hodson.

The commission recommends a number of amendments to the Public Service Commissions law. It asks authority to suspend increases in passenger and freight rates, as is done by the Interstate Commerce Commission in interstate transportation; that the long and short haul clause of the statute be made absolute except as it may be modified by the commission in special cases, and that connecting carriers be forbidden to make through rates greater than the aggregate of the local rates to and from the point of connection. The commission believes that local agents are careless in quoting rates, and asks for a statutory penalty, like that in the federal law on this subject. The commission has jurisdiction over telephone companies; and asks that this be extended to all companies instead of being limited, as now, to those having \$10,000 worth of property.

The Legislature has neglected grade crossing elimination and the report calls for an appropriation. The cost of changing grades at highway crossings is constantly increasing, largely because of the growing value of land and buildings; and a liberal policy is imperative in the interest of economy. The report gives the following summary:

"Total amount appropriated for the elimination of grade crossings prior to 1912, \$2,317,606; appropriated by Legislature of 1912, nothing; appropriated by Legislature of 1913, nothing; total amount paid by state treasurer, \$1,308,650; the balance represents the appropriations for eliminations already provided for."

The commission requests for immediate use for the year 1914 not less than \$500,000, and urges legislative provision for a continuing appropriation.

During the year the work of eliminating 25 grade crossings has been practically completed. There are 19 eliminations now well under way. Grade crossing accidents continue to increase, and the number of such accidents to automobiles illustrates that a new danger has been added to those previously existing.

The commission wants authority in aggravated cases to require railroad companies to eliminate at their own cost dangerous crossings, as where there are more than two tracks over a highway or where much switching is done.

During the year 1913, corporations operating stage route or auto bus lines were placed under the jurisdiction of the commission. The commission has granted applications from these concerns for certificates of convenience and necessity as they have been presented, prescribing as a condition that they shall operate over state highways subject to the rules and regulations imposed by the state commissioner of highways. The commission asks for more detailed authority in regard to getting information from stage lines and also for leave to exempt them from filing reports, etc.

The steam railroads of the state have been inspected and the reports are satisfactory. The number of rail breakages for the first three months of 1913 was 1,122, less than one-third the number during the same quarter of 1912. Of timber truss bridges on main lines only one span remains in use in the state. The New York Central, within two years, will have the whole of its main line from New York to Buffalo equipped with automatic block signals, three-position, upper quadrant. The Erie and the Buffalo, Rochester & Pittsburgh are making rapid progress with automatic signals. The Delaware & Hudson will soon put these signals on its line from Plattsburgh to Rouses Point, 23 miles.

The commission's agents have inspected the cars of 64 railroads and over one-half of their 6,700 engines. A general inspection has been made of the passenger cars of 38 roads. Few serious defects were noted.

The records of passenger train movements during the year ending October 31 show that 81 per cent. of all such trains were on time. The commission gives special attention to trains which are habitually late. It was at the suggestion of this commission that the New York Central and the Pennsylvania last year lengthened the time of their fast Chicago trains from 18 hours to 20 hours.

The locomotive boiler inspectors have examined 10,585 locomotive boilers.

The high-speed interurban electric roads are operating with increased safety and there has been no serious accident on roads of this class because of defective track conditions or failures of structures. Careful attention has been given to improvements in train despatching. The cars of these roads have been well maintained, and standards have been adopted for proper inspection and maintenance of rolling stock.

The commission has made extensive investigations of street railways in Rochester, Binghamton, Schenectady and Utica. Two hundred and sixty-five telephone exchanges and 95 telegraph offices have been inspected. Telephone rates have been ordered reduced in a few cases.

The commission probably will authorize the temporary adoption in New York State of the "block system" and of rates for transportation by the express companies, on a plan nearly or quite like that which has been adopted for interstate business under the order of the Interstate Commerce Commission.

The total number of complaints, applications, etc., brought before the commission during the past year has been 2,842, as compared with 1,606 five years ago. During the past year the commission has held 577 hearings. One commissioner has held hearings in Buffalo two days in nearly every week, and hearings are held in New York City nearly every week.

That part of the report dealing with capitalization is noticed in the editorial columns.

RAILWAY CONSTRUCTION IN ARGENTINA.—The legislature of Corrientes has approved a bill for the construction of a railway from Mercedes to Paso Claro. The plans and specifications for the construction of a state line from San Juan to Jachal are now completed. The Minister of Public Works will shortly call for tenders for the construction.

BELATED PUNISHMENT OF RAILROADS*

BY BLEWETT LEE

General Solicitor, Illinois Central

One of my pieces of good luck has been to work for a railroad at the time when the people are punishing railroads on account of things that happened before they were born. We are afflicted for having watered stock, now when railroad stocks look like a lemon after a circus. We are rebuked for high-handed methods of early days which none of us know of except by tradition—now, when the smallest editor can place his haughty foot upon the neck of the largest railroad officer, and the most inexpert railroad commissioner can drag the whole blooming railroad around like Achilles did Hector when Achilles had the pull. You remember the story of the little Irish boy who gave a small Hebrew an awful licking. "What are you beating me for?" at last roared the afflicted little Jew. "Because your people killed Jesus Christ." "Why, that was two thousand years ago." "I don't care," said the loyal son of the church, "I've just heard about it."

That story really illustrates the attitude of a great many people toward the railroads. Undoubtedly there was a time a generation ago, when in the hands of other owners railroad stocks were watered. People who build railroads into new communities take desperate chances, and it requires the hope of extraordinary gains to tempt them at all. But for that watered stock there would have been much fewer railroads in this country than exist today. I have been working for railroads off and on for the best part of my life, and I can truthfully say that I never knew railroad stock to be watered except by inexperienced promoters of desperate enterprises, who built their roads to sell. It has been demonstrated over and over again that the railroads of this country could not possibly be duplicated for the entire amount of their stock and bonds. In case of the railroad which I have the honor to represent, it has been estimated that its terminals alone would cost more to reproduce than the entire value of its capital stock.

The idea prevails very generally that railroads are owned by rich people. This is very far from being the case. In case of my own company, we have a little over 10,000 stockholders. Nearly 3,000 of them own less than ten shares, and over 8,000 of them less than a hundred shares. These securities are owned largely by insurance companies and savings banks which hold them for the benefit of small investors. They are owned by people who cannot afford the risk of buying securities which pay over five per cent. Railroad securities are not owned largely in this part of the country because business men here would never accept such a beggarly return on their investments. We have to place our securities in New England and old England, in Holland and France, where people will accept very small returns. When we are hard up we have to go to our bankers and get a line of credit, just like you do; and when the banker sells our securities he naturally gets a commission for his services, while we go off and thank God that the banker can still find people who will buy railroad securities at all. It is the poor people of the East and of Europe that enable us to go on improving our properties and continuing to serve you.

It is a great mistake to suppose that railroad managers, these supposed autocrats, have very much to say about running their properties. Other people fix both the wages they shall pay and the rates that they shall charge, and this is frequently done in a very inexpert way. When anybody asks me what I think of the government regulation of railroads I am inclined to answer like the minister did about the Christian religion, "It never has been tried." It takes an expert to regulate a railroad. I never knew of a railroad commissioner who was an expert when he took office. If he had been he could not have afforded to accept the meager salary offered. On account of natural ability and character some of them become expert by and by, espe-

cially if they have the luck to be reappointed. But who pays for their education? It is positively funny the way the railroads line up to urge the reappointment of the men already in. If a man is not an expert himself, in such technical and difficult matters he should follow expert advice. Such advice must be paid for, and it is never cheap. The state does not furnish the necessary money to pay for it. I believe firmly that the regulation of railroads by commissions can be made a success, whenever expert talent is employed. It has already been a success in great measure in the hands of the Interstate Commerce Commission, and of the commissions of Wisconsin and New York, and the secret of their success in so far as they have succeeded is that they have employed expert talent.

There has been a very sharp tendency in recent years to increase railroad taxes, so as to substitute taxes on the people which are unseen for those which are seen, and thus create merit for aspiring statesmen. Now, I am free to say that except as a private citizen I do not care how high railroad taxes are raised, or even what foolish laws are passed to increase the number of railroad jobs or otherwise add to the expenses of maintaining and operating railroads, if only the companies are allowed to charge enough to pay for all this and still make a fair return on their investment. If the legislature wants to double all train crews and cut all trains in two, I ask only that they will allow us to earn the money to pay all these worthy gentlemen for riding upon our trains. If it should be decided to have the railroads pay all the taxes for the support of the government, I would accept the voice of the people as the somewhat inscrutable voice of God, if only my unfortunate clients were allowed to collect in fares and charges sufficient to pay all the expenses of the government and enough more to be fairly paid for their services. If ever I should be present on an occasion when the devil should say, "Doth Job fear God for nought?" I would be tempted to answer, "I don't know about Job, but I am dead certain about the railroad companies." They work for everybody and find themselves.

When we go down to Washington and say, have mercy upon us, for we cannot make a living at these rates, we are sent away sorrowing with the words, "Depart in peace, and don't come back here until you can prove to us just how much it costs you to carry a box of shoes from Boston to Dyersburg."

The American people want to be well served. They want good service and they are willing to pay for it, provided everybody is treated alike. I have an idea that they are not going to put up with the kind of service which they have to get from a lot of railroad companies which are on the edge of receiverships. They are not going to sit like Ugolino and watch their children, their splendid railroad systems, slowly starve to death before their eyes. They will in due time rebuke the short-sighted and foolish statesmen who have brought low this great industry, and inoculated with slow poison the life blood of business. No more shall we hear "The fathers have eaten sour grapes and the children's teeth are set on edge," but rather, "He that is just shall surely live." Let us once more remember "The laborer is worthy of his hire." Let us cease persecuting the living because of the dead; let us end this tyranny over the present of the belated ideas of the past.

Instead of joining ourselves to the noble army of people who can be fooled all the time, or even to the other host of the people who can be fooled some of the time, let us, at least so far as this railroad question is concerned, cast in our lot with the saving remnant of the people who are not going to be fooled at all, but are going to use their own keen eyes and clear heads until the business of this country has been put on its feet again. We will not go very far wrong if we remember, "Thou shall not muzzle the ox that treadeth out thy corn."

ELECTRIC LIGHTING ON FRENCH RAILWAY CARS.—The French government has given instructions for fitting all the gas-lighted cars used in the postal service with electric installations.

*An address at the "Prosperity Dinner" of the Business Men's Club of Memphis, Tenn., January 15, 1914.

THE SOUTHERN RAILWAY BELONGS TO THE PEOPLE OF THE SOUTH*

BY FAIRFAX HARRISON
President, Southern Railway

The Southern Railway System includes 10,000 miles of railroad on which 59,000 officers and employees perform public services, in return for which more than \$100,000,000 of annual revenue is collected.

It is a matter of sincere regret to every railroad manager that railroad securities are not more generally held, directly and immediately, in the communities which the railroads serve. The lack of such holding deprives him of a powerful and sympathetic ally in the relation of public opinion to his problems. The time was when the railroad stocks were owned immediately at home, and by the people who were most influential in shaping public opinion, but today, while railroad stocks are generally held by the same kind of people—by those who, through the exercise of prudence, industry and courage have laid by a competence, and by the women and children for whom they worked—such investors now do not as a class reside in the territories in which they have made their investments. The explanation of this phenomenon—so well known to us all, but still a phenomenon—is part of the financial history of the United States, but the fact has given rise to a feeling among many of those who use the railroads daily and come into immediate contact with their managements, that the railroads belong to some mysterious, remote and foreign power, to irresponsible potentates, who bear, in popular imagination, the generic name of "Wall Street." We read in magazines and newspapers of the romantic lives attributed to a few individuals who are supposed to "control" the destinies of whole communities by possession and exploitation of the instruments upon which such communities depend for their necessary transportation, who "fix" rates and arbitrarily determine conditions of service, and so "tax" the people they ought to serve, withdrawing money earned in the sweat of the brow from the communities where it is earned, to be dissipated at a distance in extravagant follies. Such a vision is not the result of pure imagination—it has had unfortunately its foundation of justification in a few conspicuous instances which leap to the lips of every one who discusses our present-day industrial problems; but every intelligent man knows that it is no longer, if it ever was, the rule.

In considering such lamentable individual cases, the public, when forming its potent judgment on the present situation of the railway industry, must recognize them as the unhappy exceptions they are. To him who insists that the railroads should be judged by their black sheep, it is fair in answer to invite attention to many exemplars of high-minded integrity in the administration of railroad property. We in the South can cite shining examples of such rectitude. I may be forgiven a proud reference to my late chief, William Wilson Finley, whose opportunities were not less than those of any of the flagrant individuals to whom allusion has been made, but who after years of devotion to a public duty and the practice of a large private charity, left an estate the amount of which, as announced in the public press, is at once a certificate of candid character and an illustration of just administration. One who knew them can add to the same roll of honor two more executives of railroads in the South who have recently gone to the grave—Thomas M. Emerson and John W. Thomas, Jr.

Of the \$103,000,000 of annual revenue collected last year by the railways included in the Southern Railway system, there was immediately paid out again along its lines at least \$76,000,000, an amount not far short of the total collection from the people of the South; for approximately \$22,000,000 of the total revenues were collected from people outside of the southeastern states—a fact not often taken into consideration, the explanation

of which is that an appreciable part of the passenger traffic of the system consists of the transportation of residents of other localities traveling in the South, and, furthermore, that to a large extent freight charges on southern products shipped to other localities are paid by the consignees.

What then becomes of these great revenues collected in the South? Are they hurried away to some cavern in Wall street? No. The fact is that all the moneys collected in the South are deposited in southern banks which are drawn upon from time to time only as funds are needed for proper fiscal purposes. The funds of the system thus become an important factor in strengthening the banks of the territory, and so are at all times at the service of the southern people.

Of every dollar disbursed by the Southern Railway last year, 41.71 cents went to the payment of wages, substantially all of which are paid along the line of the road, and so remain in southern banks, a disbursement which, for the Southern Railway proper, averages about two million dollars a month. The purchase of materials and supplies used 23.30 cents, and, under our policy of buying as far as practicable from southern people, 19.12 cents of this was expended in the South and only 4.18 cents in other localities. Miscellaneous operating expenses required 6.09 cents, all spent in the South. Taxes, all paid in the South, required 3.65 cents. Interests, rentals and other miscellaneous payments accounted for 20.83 cents, and the holders of the company's preferred stock received 4.42 cents. It is unfortunately impracticable to determine the proportion of interest and dividends paid to southern owners of Southern Railway securities. I wish it was all paid to southern people; but, leaving these entirely out of account, it is seen that at least 70.57 cents out of every dollar expended by the Southern Railway remains in or is brought into the South. It may be added that these figures do not take account of expenditures for additions and betterments amounting last year to \$3,500,000, and in ten years to \$27,000,000, of which the major part, expended on roadway and structures, was practically all paid out along the line of the road. Of the total of \$76,000,000 paid out along the Southern Railway lines last year approximately \$43,000,000 went to the army of 59,000 employees and thus, on the conventional basis of five to a family, directly supported about 295,000 southern people, or about six and one-half times the population of Chattanooga at the date of the last census.

I have spoken of our preferred stockholders, but the real preferred stockholders of the Southern Railway system, in the matter of priority of claim, are the political governments of the states, counties, and cities along its lines. Their claim upon railroad revenues comes ahead even of that of employees, and they took \$3,743,704 in the last fiscal year. It is hard to grasp the significance of figures as large as this: what our tax payments really mean to the communities along our lines can be better understood by an illustrative analysis of our payments on account of school taxes and road and bridge taxes in the southern states. In 1912, our school taxes in these states amounted to something over \$800,000, or an average of \$2,800 for each county traversed by our lines. At the average annual compensation of school teachers in the southern states this would more than pay for ten teachers in each county. It represents \$2.64 out of every \$100 of school taxes paid in these states and amounts to \$15 for each school building in the states traversed by our lines. Every dollar paid to the Southern Railway for transportation charges thus includes a substantial contribution to the maintenance of the system of public education in the South.

Payments by the Southern Railway system in the same year of taxes directly assessed for public roads and bridges amounted to \$447,966.63, or an average of \$1,571.81 for each county along our lines. Every dollar paid to the Southern Railway for transportation charges thus includes also a substantial contribution to the maintenance of the public highways of the South and is an indirect but none the less real public support of the progressive movement for good and better roads.

*From an address at the annual banquet of the chamber of commerce of Chattanooga, Tenn., January 20, 1914.

I trust you will permit me to take this occasion to say finally a word of a personal nature; I believe in the South and our southern people with all my heart and soul. I have given most of the years of my manhood to an earnest, though a subordinate, part in an effort to realize a high purpose of promoting the regeneration, through industry, of the prosperity of this our beloved motherland. I have not known in my own experience the horrors either of the military conflict which left our people prostrate, or of the drear years of political disability and atrophied ambition which followed that great war between the states, in one of the chief theaters of which we are tonight, but I know the bitterness of these things in the tradition of my immediate family, and I have learned from my parents that there can be no higher aspiration than to be a part in the realization of the ideals of our southern people. Facing the future, I have then dedicated my life to that duty and to identification with the southern people. Many others have done and are doing this and I am proud to be of the company which has accomplished, through co-operation and sustained effort, so much in the last quarter of a century.

EXTENSIVE STRIKE ON THE DELAWARE & HUDSON

By a strike of employees which began at five o'clock last Monday morning, practically all the train service of the Delaware & Hudson Company, operating 880 miles of railroad, was suspended for about 16 hours. The strikers numbered about 5,000, the five principal brotherhoods joining in the strike. In the evening the company complied with the demand of the brotherhoods for the restoration to the service of two men who had been discharged, which demand was the only grievance; and the movement of the trains was at once restored.

As soon as the strike order was signed, C. S. Sims, vice-president and general manager of the company, was notified. He immediately appealed by telegraph to the Federal Board of Mediation and Conciliation in Washington. G. W. W. Hanger, assistant commissioner and secretary of the board, wired the union representatives at Albany, asking the withholding of the order pending mediation, but without effect; and Mr. Hanger then went to Albany. The grievances date back more than a year. The brotherhood leaders assert that the company laid off one representative of each brotherhood.

The two men whose cases precipitated the strike, Messrs. Slade and Lynch, were discharged many months since, when a car on their train, running on the Susquehanna division, jumped the track and bumped along the ties for $3\frac{1}{2}$ miles. The men were discharged on the ground that they were negligent and had caused much damage to property. The brotherhood committees replied that the accident was unavoidable and that no serious damage was done.

Then, for several months, the company and union leaders debated the proposition of restoring the men to work. Finally about the 12th of January, 98 per cent. of the employees voted to strike if Slade and Lynch were not restored to duty.

In a statement issued by President L. F. Loree, the company presented its side of the case as follows:

"In June, 1913, F. A. Slade, conductor, and J. A. Lynch, engineer, were running a freight train on the company's line and hauled a derailed car $3\frac{1}{2}$ miles, causing damage to the railroad property and endangering trains on the other track. After full investigation by the officers of this company it was found that these men had failed in their duty to observe the situation. It also appeared that their previous records had not been good. Mr. Slade had at one time been suspended for running by a meeting point and at another time for a 'sideswiping' collision. Mr. Lynch had been suspended four times and censured twice. For these reasons the men were discharged from the service.

"The matter of the reinstatement of Messrs. Slade and Lynch came up with several other matters in conferences . . . and

all the matters except this one were satisfactorily adjusted. With respect to this matter this company's officers felt that the negligence of the men was clearly established; that their records were not good and that they could not be reinstated without injury to the service and without exposing of the public to possible danger. They also felt and still feel that the responsibility for the continuation in the service of negligent employees rests directly upon them and that their conclusions in matters of discipline should be accepted as final."

After Mr. Hanger had had repeated conferences at Albany on Monday, both with the railroad officers and the brotherhood officers, he advised the road to surrender, which it did. A statement was then issued from the company's office, which said:

"The course of the company . . . was controlled by what it conceived to be its obligations under the Newlands law, relating to mediation and conciliation, Mr. Rea, president, Pennsylvania Railroad Company, and Mr. Brown, president, New York Central Lines, having pledged the railroads to its observance when they appeared before the President and the Senate Committee. The company, therefore, followed the provision of the act, and called upon the Board of Mediation and Conciliation. The Board responded, and sent its representatives to Albany. Having thus invoked the intervention of the Board, the company felt under an obligation to accept its recommendation. Mr. Hanger, assistant commissioner, after a full investigation, recommended arbitration, to which this company agreed, but to which the employees refused to agree. Thereupon Mr. Hanger sent to this company the following recommendation:

"January 19, 1914.

"To the Delaware & Hudson Company:

"A controversy concerning conditions of employment and other matters having arisen between the Delaware & Hudson Company and its employees, and said company having applied to the Board of Mediation and Conciliation created by the Newlands act, and having invoked its services for the purpose of bringing about an amicable adjustment of the controversy, and said Board, through the undersigned, its representative, having with all practical expedition put itself in communication with the parties to said controversy, and having used its best offices by mediation and conciliation to bring them to an amicable settlement, and such efforts having been unsuccessful; and the undersigned having further endeavored to induce the parties to submit their controversy to arbitration, in accordance with the provisions of said act,

"Therefore, as a public official, and because I believe that the controversy, if continued, will be of serious detriment to the public interest, and solely for the protection of the public interest, I most earnestly urge the Delaware & Hudson Company, without further action, to recede from the position which it has taken with respect to the reinstatement of the men in question."

"The foregoing recommendation of Mr. Hanger, for the reasons stated, the company accepted. It is obvious that this action neither enforced any principle nor does it establish a *modus vivendi*. If discipline is to be maintained, means must be found to insure the action of the Newlands law, or the railroads should be relieved of their obligations under it."

The agreement, as signed by Vice-President Sims, for the company, and by the representatives of the five brotherhoods, said, in part:

"The company agrees to restore to the service Conductor Slade and Engineer Lynch. The organizations will return the striking employees to the service immediately. The understanding is that all employees affected by the strike will be restored to their former positions in the service, retaining their full seniority rights and roster standing as held by them prior to the strike.

"The representatives of the employees will use every possible effort to restore normal conditions on the road immediately. The other matters at issue which have not yet been fully agreed upon will be disposed of by further conferences between the representatives of the men and the representatives of the road."

Up to the time of going to press it has been impossible to get

further information concerning the action of the company in apparently abandoning a position morally strong; in reinstating incompetent employees on the basis of the briefly expressed opinion of Mr. Hanger that the company ought to accede to the demand of the strikers.

TRAIN ACCIDENTS IN DECEMBER¹

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of December, 1913:

Collisions.					
Date.	Road.	Place.	Kind of Accident.	Kind of Train.	Kil'd. Inj'd.
5.	Seaboard Air Line	Columbia.	xc.	F. & F.	2 2
25.	Missouri Pacific	Boonville.	xc.	P. & F.	1 3
Derailments.					
Date.	Road.	Place.	Cause of Derailm't.	Kind of Train.	Kil'd. Inj'd.
*3.	Southern	Keysville, Va.	P.	0 0
7.	Southern	Newmarket.	P.	0 0
16.	Norfolk & Western	Gardner.	d. truck.	P.	0 1
*16.	Boston Terminal	Boston.	d. eq.	F.	0 0
30.	Phila. & Reading	E. Trenton, N.J.	m.s.	F.	2 0
Other Accidents.					
Date.	Road.	Place.	Cause of Accident.	Kind of Train.	Kil'd. Inj'd.
6.	Norfolk & Western	Wills, W. Va.	boiler.	P.	1 1
25.	Erie	Buffalo.	boiler.	F.	2 7

The trains in collision at Columbia, S. C., on the 5th, were a work train and a switching engine. The work train backed into the switcher. The engineman and fireman of the switcher were killed and two other trainmen were injured. The responsibility for the collision was charged to the negligence of the engineman of the work train.

The trains in collision near Boonville, Mo., on the 25th, were an eastbound local passenger and a westbound through freight. The engines were damaged and three freight cars were thrown off the track. The fireman of the passenger train was killed and three other employees were injured. The freight had encroached on the time of the passenger train.

The train derailed on the Southern Railway near Keysville, Va., on the 3rd, was a southbound passenger and the engine and first three cars were ditched. The wreck took fire and was partly burned up, large quantities of mail matter being destroyed.

The train derailed near Newmarket, Tenn., on the 7th, was westbound passenger No. 41, and the engine and six cars were ditched. The train was running at full speed, but the cars were of steel, and it is said that every occupant of the train escaped with only slight injury.

The train derailed on the Norfolk & Western near Gardner, Va., on the 16th, was westbound passenger No. 5, and the cause was the failure of an archbar of one of the trucks of the tender.

The train which figured in the wreck at Boston on the 16th was made up of empty passenger cars being backed into the station. The brakes were not properly applied and the leading car was forced over the bumping post and through the gates. The car took fire from a ruptured acetylene gas pipe and was badly damaged. The train shed was not damaged. This accident was due to the inability of the conductor, standing in the leading car, to apply the air brakes, because of a defective nipple in the platform pipe. The brakeman at his side went into the car and opened the conductor's valve; but not soon enough to avert the smash.

The train derailed near East Trenton, N. J., on the night of the 30th, was a switching freight. It ran over a misplaced switch

¹Abbreviations and marks used in Accident List:
 rc, Rear collision—bc, Butting collision—xc, Other collisions—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, Unexplained—derail, Open derailing switch—ms, Misplaced switch—acc, obst., Accidental obstruction—malice, Malicious obstruction of track, etc.—boiler, Explosion of locomotive on road—fire, Cars burned while running—P. or Pass., Passenger train—F. or Fr., Freight train (including empty engines, work trains, etc.)—Asterisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

and the engine was overturned. The engineman and the conductor of the train, who was riding in the engine, were fatally scalded. The misplacement of the switch is believed to have been malicious.

The accident on the Norfolk & Western, near Wills, W. Va., on the 6th, was caused by the explosion of the boiler of the locomotive. The engineman and fireman were blown out of the cab and the fireman was killed. The explosion was at the crown sheet, due to low water.

The train which figured in the accident at Buffalo, N. Y., on December 25, was a freight of the Wabash, on the Erie tracks. The fireman and a stranger were killed and seven employees were injured. The train was running at low speed. The cause was the explosion of the boiler, due to low water.

Canada.—Through passenger train No. 1 of the Canadian Northern was derailed near Lorette, Man., on the 21st, and eight cars were overturned and ditched. The wreck soon took fire, the gas pipes having been ruptured, and the eight cars were burnt up. No person was very seriously injured. The derailment is said to have been due to a broken rail.

TRANSPORTATION PROBLEMS IN NEW YORK HARBOR

[From the New York Evening Post.]

The project for the improvement of the East river is the largest and most far-reaching ever sanctioned by the War Department east of the Mississippi river. It calls for a channel 35 ft. deep through the entire East river, including Hell Gate, and into Long Island Sound; a 30 ft. access to East river wharves on both sides of the river as far north as the Queensboro bridge; the removal of shoals and reefs in the East river, and a channel 300 ft. wide and 18 ft. deep through the Harlem or Bronx Kills—at a total cost of \$15,300,000. The project has the approval of the Mayor, the Dock Commissioner, the Public Service Commission, the army engineers and the Citizens' New York Improvement Committee. There can be no question as to its necessity in this port, where the commerce is increasing nearly four times as rapidly as the wharfage facilities, nor that public sentiment unanimously supports the constituted authorities in their effort to put through a comprehensive scheme for the development of the port.

The East river scheme is but a part of a vast undertaking. With it is involved the question of the city's obtaining control of all docks in Manhattan and the development of a far-reaching plan for the retail distribution of freight. The relocation of the New York Central yards along the North River is also involved. Indeed, the whole enterprise is one of the greatest magnitude, and of particular significance just at this time because of the approaching completion of the 1,000-ton barge canal from Buffalo to the Hudson river.

The new 1,000-ft. piers in the Desbrosses street section have been begun, and also a huge dry dock at Bay Ridge. All mud banks in the river are to be removed, so that access may be had to both sides of the waterway by the largest vessels. The state of New York has already appropriated a million dollars to aid in straightening the Harlem ship canal at Spuyten Duyvil. The city is going to acquire connecting railroads along the Brooklyn shore front, operating them in conjunction with the pier terminals.

New York is bestirring itself in this matter not one moment too soon. A great advance has been made by the new Boston Port Commissioners. A monster dry dock is under way, piers are being reclaimed for the city, and three or four new steamship lines have been opened up and a local transfer charge upon shippers of freight removed. In Philadelphia, too, mighty plans are under way for the development of South Philadelphia, which will make a magnificent port of Philadelphia. When the *Aquitania* lands here next spring she will project 75 ft. beyond her pier into the river.

Maintenance of Way Section

The Maintenance Section

The publication of the Maintenance of Way Section for this month was postponed for one week to enable a report of the convention of the American Wood Preservers' Association, held this week in New Orleans, to be given in this issue. This accounts

for the failure of the Maintenance Section to appear, as usual in the third issue of the *Railway Age Gazette* in the month.

An Ice House on the Northern Pacific

The typical railway ice house is a large frame structure with poor insulation and little or no provision for mechanical handling of the ice. In operating such a house both the shrinkage of the stored ice and the cost of getting it to the cars are un-

necessarily high. A number of roads are realizing the possibility of saving a part of this expense by building better ice houses and some careful studies of designs with reference to ultimate economy have been made. A concrete construction involving a first outlay of 25 per cent. greater than for wood has been adopted by the Northern Pacific for its new house at Pasco, Wash., in order to secure a fireproof building that will avoid a recurrence of the loss sustained as the result of a fire in a large wooden house at that point. In combination with the regranulated cork insulation which was used, this type of construction is designed to reduce the shrinkage very materially, which will result in an important annual saving. In other houses which are being built particular attention has been paid to the installation of machinery for crushing and handling the ice to reduce the high cost of icing cars entirely by hand. The results of the operation of these new houses will be carefully watched for data on the actual savings to be effected by the suggested improvements.

Honesty in Timber Treatment

In his paper before the Wood Preservers' Association this week, Mr. Waterman called attention to the excellent results being secured on the Burlington from ties treated with zinc chloride and answered a query as to why this treatment gives such

favorable results in Illinois as well as in the more arid western states when creosote is being more generally adopted, by stating that only sound ties are accepted and these are then treated properly. Mr. Waterman has touched a tender point in the timber treating industry, regardless of process, which can well be emphasized. The commercial timber treating men are prone to criticize railway men for their lack of support, failing to realize that their worst enemies are within their own ranks. The difficulty which many railways have experienced in securing sound timber properly treated from some commercial plants has led a number of roads to refuse to consider treated ties altogether, and has caused others to postpone their use until they can build plants of their own. We do not mean to intimate that all, or even many, of the timber treating companies are not working to the highest standards, but the poor work of a few casts suspicion upon all and the inexperienced purchaser is unable to distinguish between them. There is no problem whose solution is more essential to the promotion of the best interests

of the wood preserving industry than the establishment of rigid principles of treatment whereby every purchaser may be assured that any material treated is what it is represented to be. The American Wood Preservers' Association, composed largely of representatives of commercial treating companies, is the best fitted to undertake this work, and the industry will not receive the full support of the railways until this is done.

Interstate Commerce Commission Seeks Tie Data

Among the 78 questions submitted to the railways by the Interstate Commerce Commission in connection with the hearing on the rate advance case are five relating to tie records. In brief, the commission desires to learn to what extent tie specifications are

based on exact data ascertained by tests; if tests have been made since July 1, 1910, to ascertain the sizes and kinds of ties, treated or untreated, best adapted for use in the various territories; the number of each kind of ties purchased with unit prices; and available data regarding the average life of each kind of ties removed from track since July 1, 1910. As shown in the article on another page, only a few roads are keeping records with any degree of accuracy and completeness, and a number keep no records. While several roads reported that they did not see the necessity for such records, this was not general. That the importance of this subject is being realized is indicated by the number of roads which are now adopting, or have recently adopted, some system of keeping tie records. While it is true that definite data of this nature cannot be secured for several years, especially with treated ties, and that conditions in the tie market are changing so that the tests may be out of date before completion, this applies only to a limited degree and there are a number of strong arguments in favor of such records. It is to be hoped that the present discussion of this subject may result in a more general adoption of methods of collecting this data so that when called on for such information in future the roads may be in a better position to reply than they are at present.

Results of Work Train Contest

No contest conducted in the Maintenance of Way section of the *Railway Age Gazette* has aroused more interest or brought out a more intelligent discussion than that on "The Proper Handling of Work Trains," which closed December 27.

The contest was not only successful in the number of the papers, but in their quality as well, and those papers published in this and succeeding issues warrant the careful attention of all officers having to do with the operation of work trains. These papers were carefully considered by H. G. Hetzler, president, Chicago & Western Indiana; E. P. Bracken, general manager, Chicago, Burlington & Quincy, and H. G. Clark, assistant to vice-president, Chicago, Rock Island & Pacific, who awarded the first prize to J. P. Costello, roadmaster, Atchison, Topeka & Santa Fe, Pueblo, Colo., and the second prize to F. W. Easton, roadmaster, Southern Pacific, Ogden, Utah. Among other papers receiving special consideration were those submitted by W. H. Cleveland, roadmaster, Atchison, Topeka & Santa Fe, Wellington, Kan.; J. W. Powers, supervisor, New York Central & Hudson River, Oswego, N. Y., and H. L. Reid, division superintendent, Chicago, Rock Island & Pacific, Eldon, Mo. In all 38 papers were received, among which were the following:

W. Krichbaum, supervisor, Erie, Huntington, Ind.; C. C. Sprigg, assistant supervisor of track, Lehigh Valley, Easton, Pa.; R. B. Abbott, division engineer, Philadelphia & Reading, Harrisburg, Pa.; Agnew T. Dice, Jr., assistant supervisor, Philadelphia & Reading, Reading, Pa.; H. B. Hoyt, assistant supervisor of track, New York Central & Hudson River, Rochester, N. Y.; S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md.; R. U. Brawner, supervisor, Central of Georgia, Columbus, Ga.; F. W. Fuller, roadmaster, Northern Pacific, Dilworth, Minn.; A. M. Clough, supervisor, New York Central & Hudson River, Batavia, N. Y.; John Carmichael, Hagerstown, Md.; F. M. Patterson, assistant engineer, Chicago, Burlington & Quincy, Chicago; T. Hickey, roadmaster, Michigan Central, St. Thomas, Ont.; G. J. Sharkey, New York Central & Hudson River, Kingston, N. Y.; M. Riney, foreman, bridges and buildings, Chicago & North Western, Baraboo, Wis.; Edwin R. Meredith, assistant supervisor, Philadelphia & Reading, Coatesville, Pa.; J. T. Bowser, chief clerk, maintenance of way department, Queen & Crescent, Danville, Ky.; G. W. Rear, general inspector of bridges, Southern Pacific, San Francisco, Cal.; George E. Lowe, track supervisor, Delaware, Lackawanna & Western, Elmira, N. Y.; Vic. W. Bennett, assistant superintendent, Southern Pacific of Mexico, Mazatlan, Mex.; L. B. Allen, engineer maintenance of way, Chesapeake & Ohio, Covington, Ky.; H. O. Whitney, roadmaster, Canadian Pacific, Medicine Hat, Alb.; T. C. Crea, supervisor of structure, Bessemer & Lake Erie, Greenville, Pa.; M. A. Box, general roadmaster, Kansas City Southern, Pittsburg, Kan.; J. H. Lynch, supervisor, Erie, Buffalo, N. Y.; J. W. Foote, division engineer, Erie, Salamanca, N. Y.; J. E. Bebb, office engineer, Duluth, South Shore & Atlantic, Duluth, Minn.; J. S. Thompson, assistant supervisor, Philadelphia & Reading, Philadelphia, Pa.; J. L. Coss, assistant chief dispatcher, Chicago, Rock Island & Pacific, Haileyville, Okla.; C. B. Finnell, traveling secretary to general superintendent, Chicago, Burlington & Quincy, St. Louis, Mo.; H. R. Clarke, roadmaster, Chicago, Burlington & Quincy, Burlington, Iowa; August Frederick, steel gang foreman, Chicago, Milwaukee & St. Paul, Elgin, Ill.; James Ryan, Jr., supervisor, Chicago & Eastern Illinois, Villa Grove, Ill., and E. M. Grime, supervisor, Northern Pacific, Dilworth, Minn.

WORK TRAIN OPERATION

FEW features of maintenance of way work offer greater opportunities for economy or extravagance than the handling of work trains. Such a train with its complement of men ordinarily represents an expenditure of \$75 to \$100 per day. When the time consumed by necessary delays resulting from the movement of revenue trains is deducted, this expense amounts to from \$12 to \$40 per actual working hour. An expenditure such as this justifies very careful study before it is requested and equally careful study to secure the best results after it is authorized.

The amount of work justifying the use of a work train varies widely under different local conditions; but each problem is susceptible of fairly accurate analysis, and careful comparisons should be made. Estimates of the cost of doing work with work trains as compared with other methods will frequently cause surprise. After all, in a large proportion of cases, a work train is only one method of handling routine work, and its use should be justified to a large extent by its relative economy. In this connection, co-operation between two different branches of the maintenance department will frequently enable a work train to be employed with economy where neither branch alone is justified in doing so.

Success in handling a work train consists chiefly in keeping it busy. Properly used in conjunction with modern labor saving devices, it will show great economy over manual labor in a wide variety of work. Improperly and inefficiently handled it becomes a very costly interference with traffic. To keep the train busy with productive work, a supervisor must have everything carefully planned out in advance, and must then discuss these plans

in detail with the foremen and conductor in charge. It is advisable that he accompany the train himself whenever possible, although this cannot always be done.

There is no place where co-operation with other departments is more essential to the maintenance of way department than in the operation of work trains. A supervisor should give the dispatcher notice that as far in advance as possible he will need a train so that the dispatcher can arrange to have the crew ready in a way that will cause a minimum of expense. The supervisor should also advise the dispatcher in detail regarding the work he desires to do so that the dispatcher can line up his trains to give the work train the maximum amount of assistance. Supervisors very frequently complain that dispatchers do not give a work train a chance when many times the fault rests directly with the supervisor or foreman who fails to inform the dispatcher in sufficient detail regarding his work. On the other hand, dispatchers frequently fail to realize that even if work trains are obstructions they are an expensive necessity and that the interests of the railroad are best conserved by carefully studying the relative costs of delays to revenue and work trains and giving each proper assistance.

The co-operation of the mechanical department in the assignment of a locomotive in good condition and adapted to the work to be done is important. A locomotive too light to haul tonnage trains of ballast, for instance, increases train mileage just as rapidly as if hauling coal. On the other hand, the assignment of a large road engine with a pile driver is equally uneconomical. Here again it is necessary that the other departments know the service for which the train is desired. The co-operation of the train and engine crews in the handling of the work train is essential to their successful operation. By their attention or lack of attention to the work in hand they can materially affect the performance of the train. Unfortunately the contracts between the labor organizations and many railways prohibit the selection of the men best fitted for this work, but even with indifferent crews a supervisor can gain much by explaining the work in hand to the conductor and enlisting his interest in this way.

In view of the widespread attention which has been given to the "Safety First" movement on the railways, it is surprising to note the almost complete neglect to mention this phase of work train service in the papers submitted in the contest on this subject, part of which are published elsewhere in this issue. The employment of large gangs of inexperienced men about trains introduces an element of danger, and the responsibility of the foremen in this regard is correspondingly increased. The large number of maintenance laborers injured and killed about work trains each year shows plainly that there is room for improvement here. The employment of rail loaders and other labor saving devices greatly reduces the number of men required and also the danger of injury. Much of the work, however, must still be done by manual labor. A large proportion of the injuries occurring about work trains are avoidable; a supervisor can well afford to give this phase of work train operation close attention.

NEW BOOKS

First Aid—Railroad Edition. By Major Charles Lynch, U. S. A. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut street. Paper; 150 pages; illustrated; 5 in. by 7½ in. Price, 30 cents, net.

This is the American Red Cross text book on first aid to the injured, abridged to 150 pages, which, however, include a chapter devoted specially to features of the subject of interest to railroad men. The Red Cross has two instruction cars traveling around the country all the time, but the author of the book rightly emphasizes the importance of keeping up instruction constantly. Railroad surgeons should give lectures regularly, and employees should be required to stand examinations. The book deals with its subject in eight chapters and there are questions at the end of each, all so lucidly arranged that any careful person can acquire a good beginning in this useful field of knowledge, before he attends a lecture.

The Economical Operation of Work Trains

The First of a Series of Papers Received in the Contest, Discussing Ways of Increasing Their Efficiency

FIRST PRIZE—THE PROPER HANDLING OF WORK TRAINS

By J. P. COSTELLO

Roadmaster, Atchison, Topeka & Santa Fe, Pueblo, Col.

Work train history is one of difficulties, and like all history repeats itself. We encounter similar difficulties annually in this class of service—difficulties which we ourselves cannot correct, and which have not been presented to those in authority in such a manner that they can be corrected. Roadmasters, as a class, have better opportunities of observing the hindrances to efficient work-train operation and better opportunities of seeing means of correcting these hindrances than other officers; but too often they have no authority to make the necessary changes. If the difficulties encountered and their remedies were properly presented to the right authority, a much higher service would be done than by furnishing statistics and figures of daily work. There are certain classes of work requiring train service which we may expect to do every year and if some of the hindrances to efficiency in these lines can be set aside, permanent good will be done. The most common of these are: loading and unloading rail, unloading ballast, and ditching.

The correct way to receive rail is on flat cars on account of the economy and safety of unloading and also because no special precautions have to be taken to prevent bending the rails when they are dropped on the ballast. It is my observation, however, that rails are shipped more often in coal and stock cars than on flat cars. Of course, it is evident that if a consignment of new cars were being delivered from some Pittsburgh car works simultaneously with the delivery of a consignment of rails from the same point, and if the destinations of both were neighboring points in the middle west, it would be economy to ship the rails in the new cars. Likewise, as is frequently the case with many western roads, when cattle are shipped to Chicago, it is economy to return the stock cars loaded with rails from South Chicago or Gary. Too often, however, are rails loaded in coal cars simply because they are the most easily secured and the operating officer knows that the roadway department will handle them, simply because it has always done so.

Also at the steel mills little or no attention is given to loading the rails in such a manner that they can be unloaded readily. For instance, during a short time spent as inspector at one of the large mills I had opportunity to watch the method of loading at that point. At this mill the rails are loaded by means of magnetic cranes. The rails are piled solidly, the first rail work-way, the next counter work-way, and so on alternately until from 19 to 21 rails (depending upon the size) are thus packed. The crane then picks up this mass, and drops it directly onto the bottom of the car being loaded. Other loads are piled on top until the car receives its full tonnage of practically a solid mass of steel. To remove the sides of a coal car is, of course, impracticable; hence, the difficulty in unloading. These rails could all be loaded work-way and two oak boards could be placed on top of each tier. This would separate the various tiers and give the unloading gang "finger room" or, in case an unloader is used, room to apply the clamp. I recognize the fact that it is proper for any piece of equipment to work to its full capacity, and I can also see that by loading all the rails work-way, the crane would be working only to about half its capacity, but the work of loading rails is a very small percentage of the work done by those cranes, and, for this reason, the efficiency of the device is decreased but slightly. Similar precautions should be taken to prevent this "welding" when rails are skidded into the cars, as is done at some other plants.

If it is feared that, by loading the rails work-way, there is

danger of their shifting in transit, simple means could be taken to offset this real or imaginary danger.

Last summer I received some sixty cars of rails and nearly every car contained short rails loaded on top of the thirty-threes. These short rails come from the "cold saw" and it is not evident why the men loading the rails should go to the trouble of mixing them.

In this day of modern equipment and labor-saving devices and at a time when the best talent in railway management are devising means for the promotion of safety, it is rather startling to note the number of roads which still adhere to the old "Armstrong method" of loading rail. Granting that track labor is not as good now as formerly, stop and consider what the laborer must do now at this kind of work. Many roads are now loading 80-lb. rails and heavier by hand; 18 men is the maximum number who can work conveniently in a space of 33 ft.; hence, a man must lift over his head, and cast a weight of 50 lbs. an average distance of about 4 ft. It is perhaps a good thing that there is no record of the number of pinched fingers and broken hands and feet.

There are at least two rail unloaders on the market which are easily able to handle a rail per minute for every work-train working minute, providing that the machine is not held up waiting for the laborers to release the rails. I have seen times when it required from eight to ten minutes to remove one "key-stone" rail in the car, and this would happen several times in the same car. This is exasperating and discouraging to the roadmaster and work-train foreman. Furthermore, one end of the rail must be lifted by hand in order to release it and with one half of the rail bound tightly, the elasticity of the rail endangers the hands, feet, and even the limbs of the laborers in the car. If rails were properly loaded, we could get the results the manufacturers claim for their unloading machines.

A wide variety of methods are found in the handling of ballast, as is evident to any one who has worked for a number of different roads or has had the opportunity of observing their methods. Although I have never yet been fortunate enough to receive ballast in cars designed especially for this class of service beyond question such equipment is the most economical for that work. These cars, however, do not lend themselves readily to revenue service. I do not object to using hopper-bottom coal cars for handling gravel, rock, or chatts, so long as the cars in the train are of uniform construction. However, when ballast is furnished in revenue cars they usually run something like this: First, a wooden car with chain fastenings; second, a steel car with hoppers running cross-wise; third, a steel car with doors running length-wise; fourth, a wooden car with four small holes in the bottom—and so on. Out of 40 cars in one cut, I once found 23 different kinds of cars. A steel hopper car with doors running cross-wise makes an excellent ballast car, and in reserving cars for ballast service each year, the management should give consideration to the class of cars and if possible should assign to each division cars of uniform construction. With cars of varying type, it is impossible to get uniform distribution of material and the work cannot be systematized because a different method of attack is required for each car.

For obvious reasons ditching is not so important an item in track maintenance in the west as it is in the east and southeast. However, in these districts much money is spent annually for this class of work on well maintained roads. If a cut is to be ditched by hand shoveling, sufficient flat cars should be furnished to provide working space equivalent to the number of men employed and in ordering the number of flats consideration should

be given as to whether or not both sides of the cut are to be worked simultaneously. If the job is of considerable size it will pay to have two outfits of flat cars and to divide the forces into a loading gang and a dumping gang. This will eliminate the necessity of the men losing time riding from the cut to the dump and return, and gives the dump gang a chance to level down the dirt after each train. The dirt should always be leveled down promptly after dumping, as it then separates better from the ballast and the danger of rain washing the dirt down into the ballast is obviated.

For light work a ditching machine which loads its dipper by the motion of the work train engine has been on the market for a number of years. With this equipment there is an arrangement for dumping the dipper onto the flats. In addition to the ditcher the complete outfit consists of a plow, cable, Lidgerwood engine, and a spreader for leveling down the dumps. This machine is excellent for light work in all ordinary earth cuts, as it is economical and maintains the grade of the ditch by mechanical means. Where there are many signs and obstacles of this nature, its utility is somewhat modified.

A ditcher whose operation is similar to that of a steam shovel should be used in earth cuts where large slides are frequent or incipient sliding is continuous. Machines of this type are now being extensively used on many roads, and their operation is familiar to most roadmasters. The auxiliary equipment should, of course, be about the same as with the outfit last described.

To get the best results when ditching with a work-train, the work should be planned to be completed before the end of October. The weather then is fairly reliable and is rarely so cold that the earth is frozen. Good weather is necessary for the economical handling of ditching work, and also for the disposition of the material.

In ordering a work-train, information should be given which will aid the chief dispatcher in making his plans in collecting the equipment. Whenever possible to do so, it should be ordered 24 hours in advance, as this will often obviate the necessity of dead-heading a crew the length of the division. Some idea of the nature of the work, the location of the point of loading or unloading, and the working limits may be of value to him.

In work-train service, co-operation between the transportation and the maintenance of way departments is of the greatest value, and good feeling between the trainmaster and division engineer or roadmaster is essential to good results. The handling of revenue service is of prime importance in railroading; nevertheless, as work-train service is necessary to the maintenance of the roadway which carries the traffic, the latter service is a part of the dispatcher's work as well as keeping the revenue trains moving.

When the continued service of a work-train is required, regular train and engine crews should be furnished, as they soon become acquainted with the work and, aside from the actual handling of the train, their ideas are sometimes very valuable. There are some conductors and enginemen on every division who like work-train service, and men of this kind should be chosen because they will take more interest in the accomplishment of the work than in finding excuses for staying in the clear. A good practice, followed on some roads, is to have the same conductors in the same kind of work-train service each year.

There are perhaps more labor-saving devices for work-train service than for any other branch of the maintenance of way department, and more consideration should be given to their economy. I know that it is the usual practice, when considering the installation of mechanical devices, to balance the interest on the investment, plus the wear and tear on machinery, the cost of skilled labor, and a number of other things, against the cost of doing the same work solely by unskilled labor, basing the latter cost on the hourly wage of the laborers. It is an established fact that there is a limited number of men willing to do manual track labor. The very nature of track work renders most of the operations, up to the present time, impossible of accomplishment by

mechanical means, but we do have an opportunity for the use of devices in work-train service. By using labor-saving devices in work-train service we may conserve the available unskilled labor for those operations which absolutely require it. I believe that the value of this conservation should be considered when comparing the cost of work done by the aid of mechanical means with the cost of the same work done solely by manual labor.

SECOND PRIZE—IMPORTANT CONSIDERATIONS IN THE OPERATION OF WORK TRAINS

By F. W. EASTON

Roadmaster; Southern Pacific, Ogden, Utah

The working season for track forces in nearly all localities is short, making it essential that materials used by track forces be placed at the most convenient points. Conditions on each district and division and on each railroad system vary owing to different physical, traffic and climatic conditions. The working schedules of organized labor vary on each system, and have a very material bearing on the subject. Single and double track operations each have their own conditions. Work demanding special train service on one railroad can be handled by regular trains on another railroad to advantage, while the type of engine used, the consist of the train, and the number of men employed with each train with economy on one road can not be worked to advantage on another. These and many other local conditions have an influence on the cost of work trains.

In figuring the average cost of work trains in this territory one can estimate train and enginemen's time and fuel only (overtime extra) at \$25 per day. (In work chargeable to operating accounts, rental is not charged for power or equipment.) The working day for train and enginemen is 10 hours, and overtime is paid as follows:

Enginemen	per hour, 48 cents
Firemen	per hour, 29.2 cents
Conductors	per hour, 48½ cents
Brakemen	per hour, 38½ cents

On work chargeable to additions and betterments, rental is charged for all power and equipment. The cost of a train for operating work, including labor and supervision, averages \$75 per day. The cost of a train for additions and betterments work, including labor and supervision, averages \$100 per day.

Overtime is not figured on as it varies widely and is governed by the location of the work train and enginemen's schedules. To get in a full working day it is economy to pay the train crew overtime, but this should be watched closely at all times, as it runs from \$2 to \$12, and will average \$6 per day.

Before requesting special train service, a roadmaster should see if the work cannot be done by local or other regular freight trains. Many work train days can be saved by doing this if the work will permit. Train and enginemen's schedules should also be consulted regarding the time limits covering work-train service to avoid paying trainmen unearned time. Except in cases of emergency all requests for special train service should be approved by a superior officer, who should go over the work in hand carefully before authorizing it. The supervisor or roadmaster should accompany and remain with all trains doing work under his charge. If this is impossible a competent man who has recognized authority over the gang foremen, and who is familiar with train movements as well as with the work, should be put in charge of the train. On all work requiring a number of work trains for a considerable period of time, making it impossible for the supervisor or roadmaster to take charge in person all the time, a man familiar with train movements, switching, train rules and train and enginemen's schedules should be put in charge of all the trains, reporting directly and only to the party in charge of the work.

As the working time on main tracks is more or less limited, depending on the traffic, everything done to expedite work on main tracks as a rule adds to the efficiency. Rail should be loaded on flat cars. When necessary transfer rails from box,

coal or high side cars to flats at some convenient point. All important terminals have transfer cranes, or cranes that can be used for this purpose, which will greatly reduce the cost of transferring.

Handle carloads of ties in regular trains to the nearest point where they are needed so that a work train distributing them will not be overloaded, and can pick up and switch out empties when clearing trains. Do not haul unnecessary cars in the train. Have enough labor to work all cars to the full capacity, and place enough men on the ground to keep the ties clear of trains, not overlooking the fact that the train is being used to distribute ties at the most convenient point.

When ballasting and distributing ballast for renewals, modern equipment is economical in train movements as well as in the cost of handling the material. The number of trains used is governed by the loading and unloading facilities and the hauling distance. Assign train and engine crews permanently to the loading, unloading and hauling trains. If modern equipment is not available and flat cars used, equip them with movable side boards and use plows and a spreader. If hand labor has to be used, work every car in the train and get the material off the cars as rapidly as possible.

Use large engines when tonnage can be given, as with hauling and in many cases with unloading trains. Where running and switching have to be done quickly in such work as distributing or loading material, trains that work on heavy traffic main tracks can use smaller engines that can get out of the way quickly. The capacity of engine tenders is a very important matter. They should carry enough water to last at least six hours, and fuel for a full working day. When working some distance from a water station a water car with tender connections will eliminate many expensive delays running for water.

Work trains in general "roustabout" road service should be as short as possible, handling only the actual working cars with a platform car for laborers to ride in safety. Always have excess power to facilitate movements.

Every member of the train crew should be in their respective positions, so there will be no delay when ready to move. Train and enginemen who are known to be especially adapted to work-train service should be chosen and assigned, although union schedules will not always permit of this. When this cannot be done the next best thing is to bulletin the runs if the work period will permit, as it is essential that regular men be used on trains. Crews catching trains that do not last the bulletin period should remain with the train until the work is completed regardless of whether a train ties up at a terminal or not, as breaking in a new crew every day, as is now done under the present working schedules, is expensive. Tie up trains at the nearest suitable point to the work regardless of whether it is a terminal or not. Getting to the work on time cuts down the overtime, gives the crew proper rest, and gets a full working day out of the track forces, while the wages paid the engine watchman and the expense of getting fuel to the tie-up point is money well spent. As gangs should be worked full working hours the overtime paid the train crew making up the train after or before working hours is small compared to that of the average gang standing idle. To overcome overtime paid train crews coming and returning from work hold up the work if possible until a train can be used at least three days, unless the work is near a terminal. Give the train and enginemen's schedules close study, as there are a few clauses that cost money.

Picking up small gangs of section men and taking them back to their home station takes time from the working hours, gives overtime to train crews and at times means excessive delays on account of meeting or passing other trains. When using the section men move them on regular trains to and from the work when possible. Extra gangs living in cars can be used to good advantages, as the cars can be placed convenient to the work. Keep the train full handed at all times to offset the expense of the train.

Work trains working on main tracks can only be classed under the head of an obstruction, and as such should be treated accordingly, being given every advantage to do the work and then taken off. Such is not always the case. After reading the orders given a work train the party in charge frequently wishes the work was on a siding instead of on the main track. When time table and important extra trains are on their schedules the dead time on siding cannot be complained of, as the despatcher's first duty is to keep the regular trains moving and have the track clear for their passage. He hears promptly if he fails to do this, while it is only in exceptional cases that he sees figures showing the cost of men lying idle or the additional cost to the work caused by dead time of work trains. To overcome this, orders should be given work trains to protect against all second class trains and all first class trains after they are known to be late. All concerned on the work trains should be given to understand all such trains must be cleared when they show up, and proper discipline will prevent this being abused.

The man in charge of work trains should see the train orders, consult with the conductor and figure train meets and movements with him so that the work can be lined up to meet the train movements. He should also explain the work in detail to the conductor to enlist his interest in the work. The conductor, in turn, should explain to the engineman the work to be done. Although he works by signals his knowledge of the work will make the signals more clear to him and will help him to figure on water and fuel.

The man in charge of the work train should figure out each day the actual cost of the train and the work in dollars and cents. These figures are much more instructive than those showing one train and so many laborers, and give him an insight into the overtime. They help to stop any leaks caused by bad handling, and in some cases he may find the work being done does not warrant the expense.

ESSENTIALS OF SUCCESSFUL WORK TRAIN OPERATION

By H. L. REID

Division Superintendent, Chicago, Rock Island & Pacific, Eldon, Mo.

Work train service is divided into two classes, temporary and permanent, the former class including those trains which are used for one or two days only, unloading or loading material or performing some emergency service requiring the use of an engine crew. In this class of service the greatest loss of time occurs because of lack of proper instructions, inexperienced crews and delays in yards, due to the train starting from the terminal on its initial trip.

Permanent work train service is that which is required through an entire working season, such as with a steam shovel, pile driver, for ballasting, etc. It is of the utmost importance that the conductor and brakemen should be especially qualified for this service and, if possible, the selection should be made by the officer in direct charge of the work. In the case of pile driver work, the engineer should also be selected. Regular engines in first-class condition and sufficient engine watchmen should be furnished to admit of the engines being ready for work on time when tied up at outside points. A sufficient number of car repairers should be provided at ballast pits to make small repairs to equipment to avoid the necessity of the equipment being hauled into the division terminals, resulting in shortage of cars. Sundays should be utilized for repairs to work train equipment to avoid delays during the week. At ballast pits telephone or telegraph connections should be available in order to prevent delays.

The foreman and conductors in charge of the work trains should render a daily report by wire to their superior officers showing the amount of work performed and the cause of delays. These reports should be condensed in the superintendent's office daily, delays investigated and the cost of the work shown. The latter information should be given to roadmasters and others in charge of the work, in order to show them just what is

being done. The delays sustained by the work trains should be promptly investigated and the despatchers and train crews impressed with the importance and the necessity of giving work trains preferred movement.

Staff meetings should be held not less than once each month with the division officers. The conductors and the foreman in charge of the work should be present. The difficulties experienced in handling the trains during the previous period will soon come to the surface and can be speedily remedied.

In both temporary and permanent work train service the most important things are well qualified crews; first class motive power; well maintained equipment; proper instructions issued in ample time to admit of no delay; proper handling of the trains on the part of train despatchers; frequent visits of supervising officers to the work and a stock of duplicate parts of those sections of the machinery, which break frequently. Co-operation between the roadway, transportation and mechanical departments is also absolutely essential to the economical operation of work train service.

THE USES AND ABUSES OF WORK TRAINS

By W. H. CLEVELAND

Roadmaster, Atchison, Topeka & Santa Fe, Wellington, Kan.

In the operation, maintenance and construction work on a division, the features involved in the proper unloading and picking up of material, ditching, etc., with work train service, embrace a high cost of service involving a vast expenditure annually. Hence the proper handling of work trains is worthy of serious consideration from all points of view, not only as pertains to the handling and manner of work trains to secure the greatest benefit, but also to avoid using work trains that can be handled with less expense by some other means. In using assigned work trains an effort should be made to have experienced supervision of the trains as well as the work under way. Experienced and energetic train crews are one important feature in operating work trains with economy and safety, and in greatly increasing the amount of work accomplished daily. In handling permanent work trains it is possible, through our knowledge of the personal qualifications of the employees of our respective divisions, to keep competent train crews in work train service, at least a part of the time, but when using occasional work trains, it is necessary to use crews first in and first out, which, in many cases necessitates using a different crew each day. As a matter of fact, this greatly retards the continuation of the work under way, for when a crew does a class of work one day, the men understand the working conditions, and can pick up the work where they left off the previous day and carry it on much more expeditiously than a new crew. Hence work done with temporary work trains, using crews first out in turn, costs proportionately more for the work accomplished than when done with a permanent or assigned crews.

Where the work is extensive and it is not possible for a roadmaster or supervisor to be present always an effort should be made to keep in charge of work trains a regular track foreman who is fully competent and conversant with all the working and physical conditions of the division, and fully instructed in the work under way. The number of laborers to be assigned to work with a work train, should be governed by the class of work under way. There can be no regular set rule for manning work trains, for the assignment varies with each class of work done, and is a feature that should be handled by the supervisor in charge of each particular piece of work. On one hand it is very expensive to have more men employed with a work train than can be used to good advantage, while on the other hand it is much more expensive to have a work train insufficiently manned, so that the work will not be done with despatch and the full benefit derived from the train.

The relatively high cost of work train service makes it essential that all the work possible be done during the working

hours of the day, and to do this requires the energetic, constant and faithful co-operation both of train crew and of the foreman or supervisor in charge of work under way. Much depends on the train crew, for to them we look for the prompt movement of the train. If not handled promptly there is a short delay for the men, and many short delays during the day are equal to one long delay. To delay a large force of men, even for a few minutes now and then, is very expensive. We also look to the train crew for the safe and economical handling of the train to get the best results between the time of trains in commercial service. While working under work train orders, and under flag, the crews should work all the time consistent with safety, and after being driven to a siding to clear a passing train, should endeavor to get back to the place of work as quickly as possible, never overlooking the matter of taking a supply of water when the chance affords without delay to the movement of the train.

When working against traffic the foreman in charge should always watch conditions and figure for the least delay to work train or men. If, for instance, it is necessary for a work train to run into a siding to clear an approaching train, and it is expected to return at once to the place of work, the foreman should not permit the laborers to ride back and forth on the train, but should remain with them at the point of work, for in nine cases out of ten he can find something profitable for the men to be doing until the train returns. Also it is much safer for the men to remain on the ground than to ride back and forth with the train, and does away with the delay in loading and unloading the gang.

Work trains should be provided with water tanks of sufficient capacity to eliminate the necessity of running for water during working hours, and the crew should be instructed to take their dinners out on line when consistent, to avoid delays returning to dinner. As ten hours constitute a day's work for work trains they should be called to leave the terminal point at a time best suited to avoid the delays of incoming and outgoing traffic. For instance, if working near a terminal where incoming traffic will retard a work train leaving between 6:00 a. m. to 7:00 a. m. and it will have clear track at 7:00 a. m., the best time for departure would be 7:00 a. m. This would not interfere with a train's doing ten hours of work in co-operation with the working hours of track forces, while to call them earlier than 6:00 a. m., in order to clear the conflicting traffic would necessarily create work train over time in order to support the track gangs. Long runs to work for work trains should be avoided when consistent, by tying the crew up at some intermediate point on the line.

Work train rights are sometimes abused by the train despatchers giving orders detrimental to the work under way, often holding them in sidings unnecessarily long, and by sometimes instructing them to do other work, such as switching cars for fast freight trains, spotting cars for station uses, assisting delayed trains, unloading stock, or some work of like character. While this may look good to the despatcher from a distance, it is very expensive to the company by delay to the work train service and the men employed. I have known of instances of this kind where two large gangs have been delayed by a work train conductor in doing some commercial work under instructions of despatcher, thereby causing an expensive delay to the track department, with only slight benefits to the transportation department. Except in a case of extreme emergency, when handling this with a work train will be of considerably more value to the company than the expense of the bad delays to the track department, he should handle such work with local and commercial trains the same as if the work train had not been in existence.

Under normal conditions when no construction or reconstruction work is being done on a division, and excepting such work as cleaning ditches in heavy cuts, much of the work can be accomplished by the use of local trains and commercial freights with much less expense than by ordering work trains. If a car

or two of cinders, ties or ballast is to be unloaded, it can be done by the regular local crews, generally without overworking the limit of their working day, or making any back run to accomplish the work. Even if a local crew should make some overtime occasionally, the work would be accomplished with greater economy than by letting the work accumulate and then being compelled to order out a work train. By keeping in touch with the situation this work, such as unloading cinders and other material to be distributed and picked up on line, can be handled promptly in such a manner that all can be done by local crews with a great saving of work train expense. Material piled on division for future use should always be stored where it can be loaded into cars placed by local trains. In case of a consolidated shipment a quick accumulation of several cars of material to be unloaded on the line, more than consistent to burden local crews with, in many cases we find by conferring with the trainmaster or despatcher that they are contemplating running an extra train to get some class of equipment over the line or are compelled to run power light to meet some emergency. In such cases they can easily arrange for this extra to handle work for the track or bridge and building department, for two or three hours with but very little inconvenience or extra expense to the train.

During the past year our reconstruction and maintenance work on the Panhandle division included ballasting 30 miles of track with crushed stone on eastern part of division and laying 30 miles of 90-lb. rail on the extreme west end of the division, resurfacing the latter on crushed stone ballast, respacing ties, and tie-plating in full, adding eight screw spike ties per 33-ft. rail. This required the almost constant service of a work train on the east end to handle and unload the daily output of ballast and to support the extra gangs in other classes of work. This work train and work was handled in the following manner: Our ballast was being received from a point east of us and our portion of the ballast output of the crusher was delivered at our eastern terminal point each night. The work train tied up at this point, and was ordered to leave at 7 o'clock each morning with all the ballast loaded. As all our morning passenger and local trains had arrived and departed by this time, the work train had a clear track. Since we received our ballast from the east, we arranged to do our ballasting working west.

The organization of track forces consisted of three extra gangs of an average of 40 men each. One gang worked in the front ditching cuts, skeletoning track, renewing ties and preparing the sub-grade to receive the ballast. This gang also unloaded the ballast for the first lift. A gang following made the first lift, and the third gang made the lift and dressed the track. All our ballast was handled in center dump cars, and ballast plow was placed at the rear of the loads, next to the way car. The work train conductor was instructed to stop at the finishing gang if signaled to do so and to let the foreman have what ballast he desired for the day's work. He then proceeded to the gang making the first lift and let the foreman of that gang unload what ballast he desired, and then proceeded to the skeletoning gang at the front, where the foreman unloaded the remainder of the ballast in his open track. In unloading the crews were always instructed to begin on the car next to the engine to avoid pulling cars through the unloaded ballast, and so to eliminate the possibility of empty cars being derailed by ballast on the rail.

After the train crew had finished unloading the ballast they set out their empty ballast cars, picked up flat cars that were held in work train service and reported to the foreman in charge of the ditching and preparing the road bed to receive the ballast, working under his instructions the remainder of the day. At the close of the day they picked up the empty ballast cars and returned with them to the terminal. This system gave us the full benefit of a work train each day, attending to the wants of each extra gang, unloading and distributing the ballast, ties and other material, and also removing the surplus dirt from the cuts and

placing it on the shoulder of fills where needed. After the heavy work of ditching cuts and unloading ballast for the first lift was completed, the work train was discontinued and the unloading of ballast and other material, was done very successfully by local crews and extra drags, with but little delay or extra expense to either the transportation or track departments.

As our work on the extreme west end of the division was so far from our eastern terminal it could not be served with the same work train, and as this work required only an occasional car of ballast for dressing it was delivered and unloaded by local crews. We loaded all rail with a small derrick belonging to the bridge and building department, which was operated with a work train crew, a derrick engineer and six laborers, under the supervision of a section foreman. In this manner we accomplished as much work as is ordinarily done with 16 to 20 men without the use of a rail loading derrick. We also picked up and loaded our ties with this derrick, handling as many ties with this number of laborers as could have been handled with 30 men without the use of a derrick. Our handling of ties was very extensive, as we inserted 1,280 screw spike ties and relieved and picked up 1,280 second hand ties per mile. In handling the second hand ties they were thrown into piles of 20, with one end of the pile resting on a ground tie. This permitted passing a chain around them and hoisting them into a car in a few seconds. Ties can be loaded rapidly in this manner with a force of six laborers, two on the ground to handle the chain and four in the car to place the ties. I find also that ties can be picked up in this manner almost as quickly from the bottom of a barrow pit along a 20-ft. fill as from a level point, thereby doing away with the labor and delay of carrying ties up the embankments or the necessity of keeping them on the shoulder of fills where the space is limited, and where the working room for men is an important feature. Also in reloading ties from piles to be distributed for insertion, 20 to 30 ties at a time can be picked up and lowered on to a flat car with six laborers as rapidly as it is possible to be done with 30 men loading single ties by hand.

DIFFICULTY OF PROPERLY HANDLING WORK TRAINS

By L. B. ALLEN

Engineer, Maintenance of Way, Chesapeake & Ohio, Covington, Ky.

The work train is an all important factor in economical operation. Good work in the line of economy can be done by proper supervision of work trains when they are necessary. Better work can be done by not ordering work trains when they are unnecessary, as an improperly handled work train can waste money and run up needless expense as fast as any other item in operation. The cost of work trains is increasing with the raises in wages of train and enginemen, while the amount of work accomplished per day is decreasing with service conditions inserted in agreements with organized train and enginemen.

On many roads a work train called for one or two hours work costs the maintenance of way department the same as a full day's service. The agreements with trainmen regarding work to be performed by local freight trains makes it practically impossible to get a car or two of ties or cinders unloaded by local freights and a work train must be called, incurring a full day's work train cost. One may say, "Why order a work train to unload two or three cars?" One of the most, if not the most, important duties of an operating officer is to move cars. Any operating officer from the president down to the superintendent who rides over a division and sees two or three cars of company material on side tracks, probably at widely scattered points, will wire to the office, and thence to the supervisor to release the cars and get them moving. A work train is ordered and the cars are released. A work train day is paid for and one-fourth of a day only is secured. The per diem and use of the cars is saved for a day or two. Had the cars been allowed to stand one or

two days, more cars would have accumulated and a full work train day's work secured. Perhaps the superintendent saved something in car service, but the maintenance of way department paid the bill.

A work train on the main line leaves a flag and goes out to do its work. A freight train comes up to the flag and calls or drives the work train in. Delay is caused to the freight train and possibly to one or two following if on a busy line. This causes costly over-time and frequently the calling of relief crews. If a work train is manned with a large gang of laborers with the idea of accomplishing the work to be done quickly between trains, every delay means that an expensive gang is drawing pay for time lost waiting on the train. If a small gang is put on to avoid this, the delay to trains increases. Some work can be so arranged that the work train gang is not losing time while the work train is clearing for other trains, but in practice this is the exception and not the rule. Much good money is paid out to laborers riding work trains into sidings to let trains by. A supervisor or a train master cannot be with every work train as the trend toward economy has lessened supervision and lengthened territories.

Train service conditions and agreements with trainmen prevent the selection of the best conductors and crews for work trains. A good work train crew familiar with what is required and working with the company's interest in view may be replaced by an inefficient crew. A good work train conductor who knows how to use a red flag can do more work in a day than a "six o'clock and pay day" crew can do in a month.

The foregoing constitutes a few things the supervisor does not always consider when he requests a work train and the superintendent does not always consider when he authorizes it. Work trains are at best a costly luxury, but they are some times a necessity. There is economy in their supervision and last, but not least, let the dispatcher give them a show.

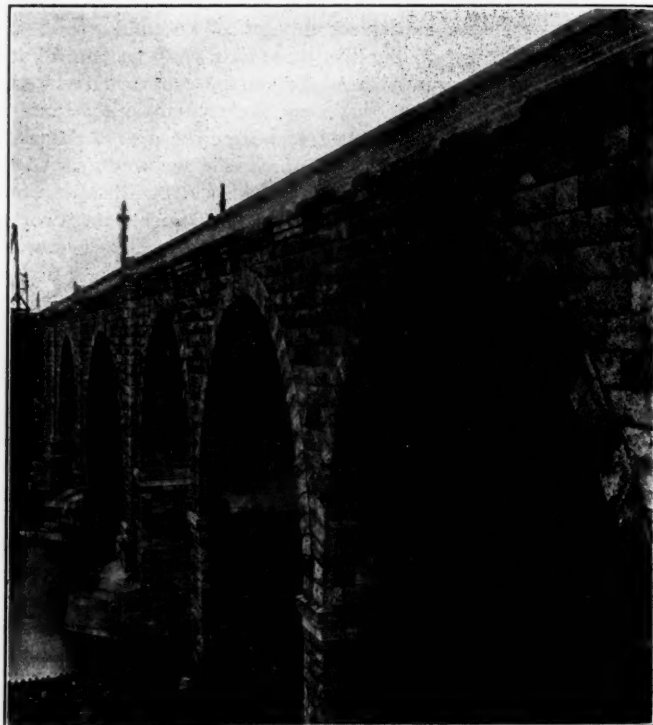
FIVE-TRACK CONCRETE ARCH BRIDGE OVER THE SCHUYLKILL RIVER AT PHILADELPHIA

The work of widening the Pennsylvania's bridge over the Schuylkill river in Fairmount Park, Philadelphia, was described in the *Railway Age Gazette* of December 19, 1913. At the time that description was written it was expected that the old brick arches in the existing double-track bridge could be repaired and it was not decided whether the truss span of the old structure would be allowed to remain or be replaced by concrete arches in conformity with the double-track addition. It has since been decided by the engineering department of the Pennsylvania to proceed at once with the replacement of this truss span and to rebuild the old arch spans in place of repairing them.

The old bridge, built about 1866, consisted of seven 60-ft. brick arches faced with sandstone ashlar on each side and one 242-ft. deck truss span. The length of the barrels of the arches and the width between parapet walls was 25 ft. This bridge has been a source of trouble for years. The abutment piers supporting the steel truss were enlarged to double their thickness in 1873, and a panel on each end of the original truss was removed so that the span would rest on the masonry then constructed. The original abutment piers were located on stone-filled timber cribs, and the thrust of the 60-ft. arches caused the piers to push and the foundations to settle. The extension of the masonry in 1873, which was carried down to rock without any cribbing, prevented further settlement, but the narrowness of the bridge, together with the increasing weight of train units, started cracks in the arches many years ago, which have gradually become worse. All of the arches have cracked between the stone voussoirs and the brick rings, the most pronounced ones being in the arches next to the steel span. The two piers on the edges of the river were also built on stone-filled timber cribs, and considerable settlement took place several years ago. As these timber cribs extended upstream beyond the ends of the piers, it was impossible to locate the new two-track bridge directly

against the old one, and an intervening space of 15 ft. was allowed.

While the old bridge would probably have lasted a few years more by the use of additional reinforcing and tie rods, it is considered advisable to rebuild it at the present time in connection with the new bridge, while the trains are diverted to the new two-track structure. The brick arches down to the springing line and the two narrow piers located on the edges of the river on timber cribs will be rebuilt to carry the two original tracks and to close up the intervening space between the old and new bridges. It has also been decided to remove the steel span, which has not yet reached the end of its usefulness and will be



New Double Track Portion of Schuylkill River Bridge After Completion

used at some other point on the road. When this work is finished there will be a complete five-track concrete arch bridge faced with sandstone.

ANNUAL TRACK INSPECTION ON THE ROCK ISLAND

Prizes based upon the conditions of the track have just been awarded to roadmasters on the various districts and subdivisions of the Rock Island. A prize of \$100 is awarded to the successful roadmaster and \$50 to the successful foreman on the different divisions or subdivisions. The names of those roadmasters winning prizes are as follows: C. A. Barr, Chicago Terminal division, Chicago; T. O'Brien, Iowa division, Atlantic, Ia.; R. Stanley, Missouri division, Trenton, Mo.; C. Linehan, Cedar Rapids division, Cedar Rapids, Ia.; J. McNulty, Minnesota division, Waterloo, Ia.; J. W. Petersen, Dakota division, Estherville, Ia.; N. T. Blackwell, St. Louis division, Windsor, Mo.; W. Broddle, Kansas division, Herington, Kan.; A. Shumate, El Paso division, Liberal, Kan.; J. L. Hayes, Nebraska division, Fairbury, Neb.; H. O. Sinsabaugh, Colorado division, Goodland, Kan.; R. E. Herndon, Arkansas division, Little Rock, Ark.; C. H. Carpenter, Louisiana division, El Dorado, Ark.; J. Bolton, Indian Territory division, Haileyville, Okla.; George Woods, Oklahoma and Pan Handle divisions, El Reno, Okla.; W. H. Gruhlkey, Amarillo and Southern divisions, Amarillo, Tex.

Northern Pacific Ice House at Pasco, Wash.

A New Structure of 30,000 Tons Capacity Has Been
Built of Concrete with Regranulated Cork Insulation

By HENRY I. CHURCH

Assistant Engineer and Chief Draftsman with C. A. P. Turner

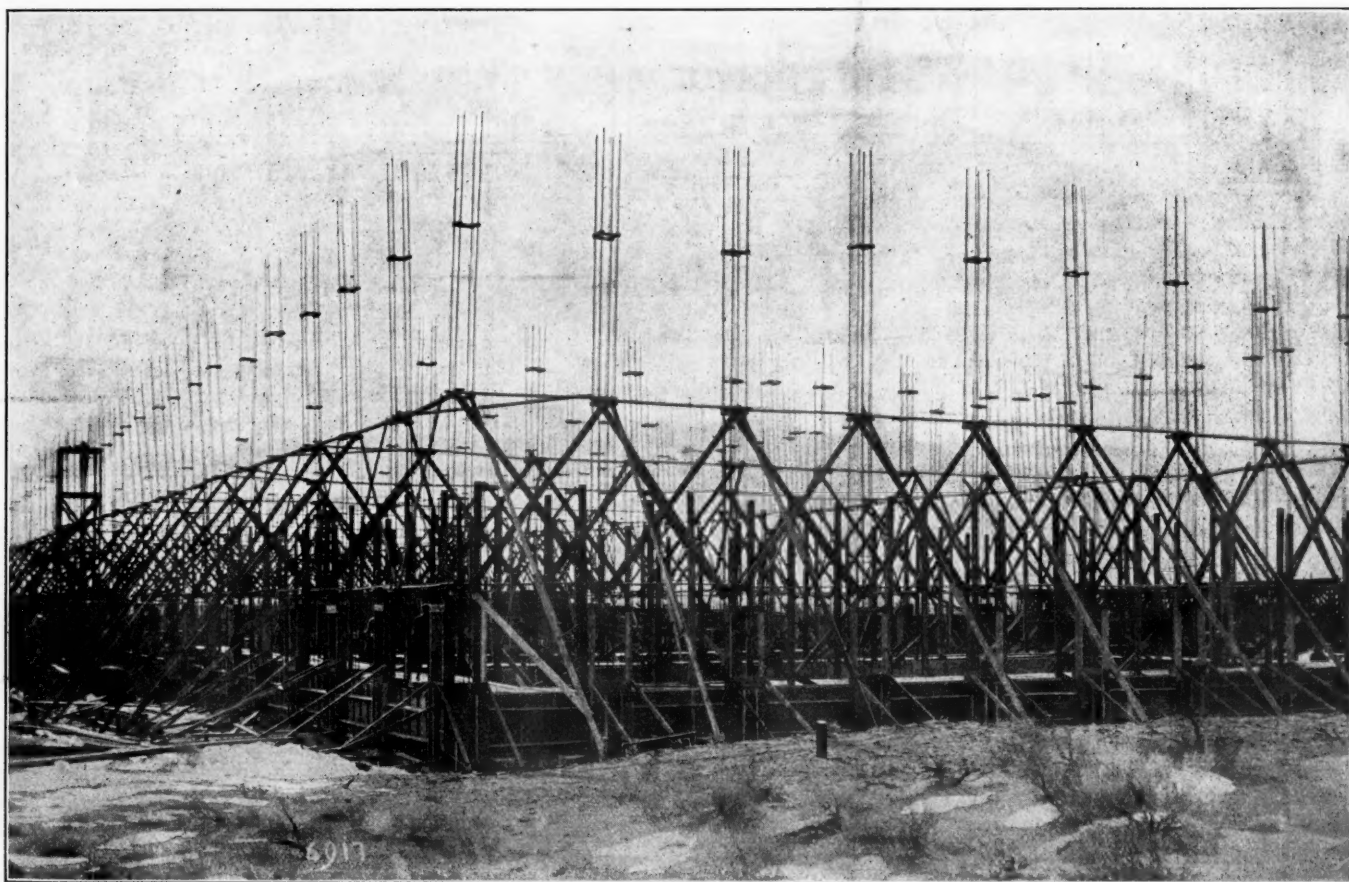
The refrigerator cars used by the Northern Pacific to transport the fruit raised in the Yakima valley and the Walla Walla district are iced at Pasco, Wash. Two years ago this company suffered severely when almost their entire supply of ice was lost through the burning of a large wooden ice house at Pasco. When the railroad decided to rebuild, the question of fireproof construction came up; and even though investigation proved that reinforced concrete was about 25 per cent. more expensive than wood, it was decided to construct the new building of this material.

The new ice house is 483 ft. long, 94 ft. 6 in. wide, and 41 ft. 10 in. high to the roof at the center line of the side walls, and has a storage capacity of 30,000 tons of ice. It is divided into

the wall. Bolts, spaced 4 ft. apart and running through both walls on the same vertical line as the 2 in. x 10 in. timbers hold the two walls solidly together and give considerable additional stiffness to the structure as a whole. These bolts are long enough to hold in place the lagging on the inside of the building, which will be described later.

The floor is made of a 4 in. concrete slab reinforced in both directions, and laid on 16 in. of cinders well tamped for insulation. To provide drainage and give the ice a tendency to tip away from the walls, the floor is sloped from all four sides to the center in each compartment.

The ceiling is of the beam and slab type of reinforced concrete. The slab is 4 in. thick, reinforced two ways. The beams running



Early Construction Period, Showing Vertical Reinforcement in Position

12 compartments by walls of the same construction as the exterior walls. These walls consist of two 4 in. concrete walls reinforced vertically and horizontally, and cast with a 10 in. space between them, which is filled with fine regranulated cork for insulation.

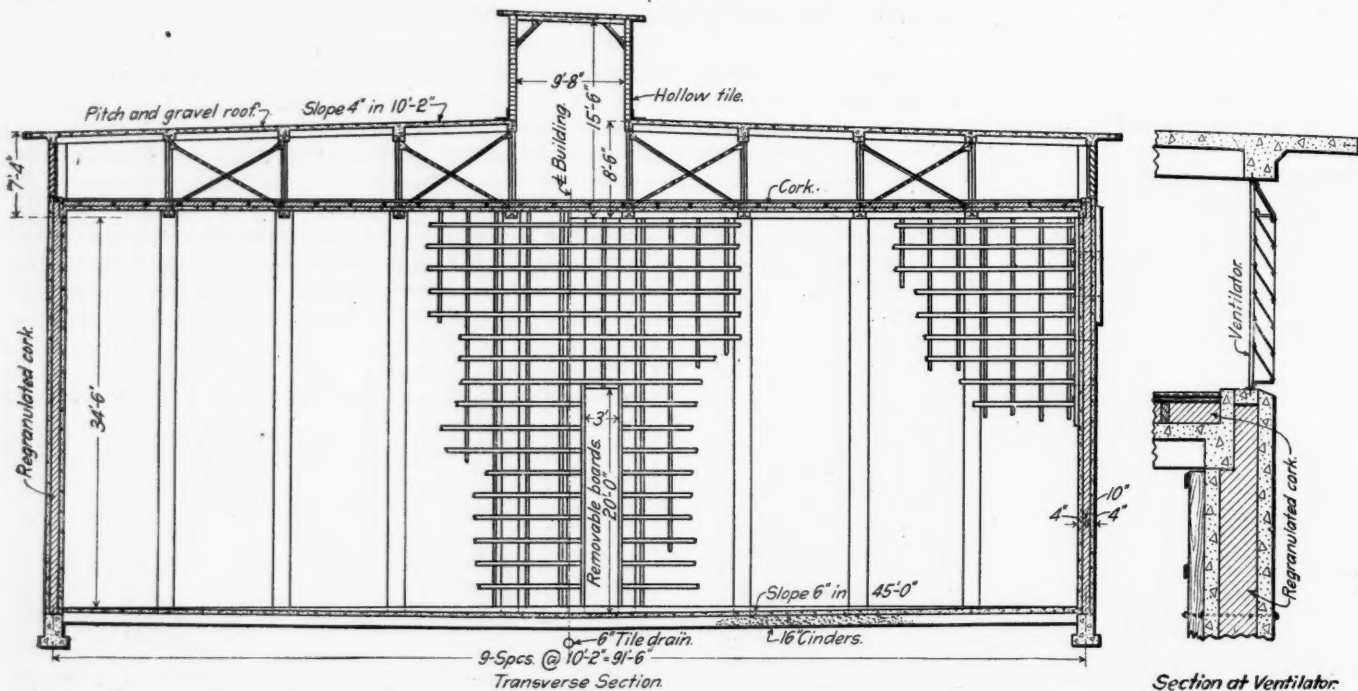
The walls are made rigid by building columns spaced from 9 ft. to 13 ft. 4 in., cast monolithic with the walls. Insulation around the exterior columns is provided by building U-shaped concrete pilasters and filling the space formed by the U with granulated cork. These pilasters were cast monolithic with the outside walls. The walls are given additional stiffness between columns and made to act together by inserting two 2 in. x 10 in. fir planks spaced equi-distant and extending the full height of

lengthwise of the building are framed around the bottom chords of the trusses which support the roof and ceiling. The beams framing into the longitudinal beams are spaced so as to give panels 13 ft. 4 in. x 10 ft. 2 in. On top of the ceiling slab 2 in. x 6 in. timbers are placed 3 ft. between centers, and fine regranulated cork is tamped between them giving a 6 in. thickness of insulation. Boards $\frac{7}{8}$ in. thick are nailed to the 2 in. x 6 in. timbers and covered with two layers of oiled paper. On top of this is placed $1\frac{1}{2}$ in. of cement mortar reinforced with McMillan's wire netting. This construction gives a solid ceiling and provides excellent insulation.

The reinforced concrete roof is supported on 40 ft. Warren steel trusses with sub-verticals supported on the end and trans-

verse walls. The roof slab is divided into panels of the same size as the ceiling and is covered with a tar and gravel roof laid under the Northern Pacific specifications. The slope of the roof is about 4 in. in 10 ft. This double construction of ceiling and roof is designed to give additional insulation and to provide room for ice chutes leading from elevators to the outside of the building. Ventilation of the space between the ceiling and the

resistance in starting, allowing a starting current of 150 per cent. of full load running current. The capacity is 2,000 lb. at a speed of 75 ft. per minute. The cars are constructed of steel and are designed to unload the ice automatically into the chute at the top of the building. The elevator shaft is made of structural steel and is designed to resist any lateral displacement of the ice that may take place. It also carries the guides for the



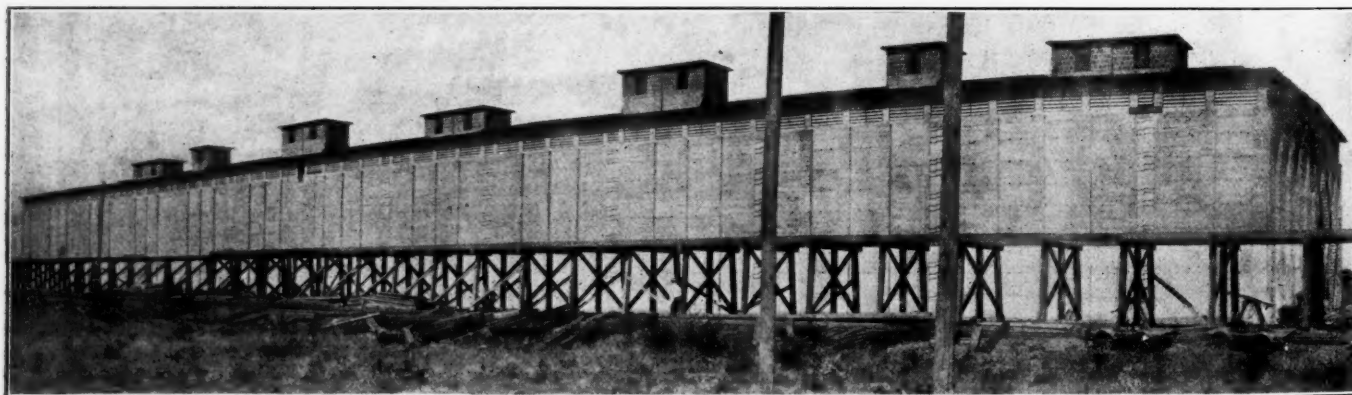
Section Through Northern Pacific Ice House Showing Cork Insulation

roof is provided by galvanized iron ventilators fastened to the concrete by means of expansion bolts.

The cupolas or pent houses built along the center line of the building are provided for ice chutes and elevator machinery. The frame is of structural steel supported by two middle rows of trusses and the wall is made of hard burned tile laid in cement mortar except in those parts carrying the slabs supporting the elevator machinery where they are of hard brick laid in cement mortar. The roof on the cupolas is of reinforced concrete

elevator cars. No equipment is furnished for filling the ice house, as this is all done by the contractor who supplies the ice. One steel ladder is provided for each compartment. These ladders are attached to the division walls by means of angles which run horizontally through the walls and project about one foot beyond and to the ends of which the ladders are bolted.

Ice chutes run from each elevator to openings in the side walls just above the ceiling slab where the ice is delivered to special conveying machinery and transferred to the icing platform.



View of the Completed Ice House

covered with a composition roofing of tar and gravel similar to that on the main roof.

Each compartment is provided with an elevator operated by an electric hoist. After considerable investigation it was decided to use a direct-connected worm-gear type manufactured by Lee & Hoff Mfg. Co., St. Paul, Minn., with all machinery placed on top of the hatchway. These elevators are equipped with all possible safety devices and are driven by 11 h. p. slip ring induction motors, 3-phase, 60 cycles, 220 volts, using external grid

The ice chutes are made of wood supported on wooden bents placed from 10 to 14 ft. apart and have a minimum fall of 1 in 20. The 2 in. x 2 in. oak strips forming the bottom of the chutes are protected from wear by 1 in. x 1/4 in. half oval steel strips.

On the west side of the building, one door is provided for each compartment for filling purposes and to give easy access from one compartment to another, each division wall has a door 3 ft. wide by 20 ft. high located near the center line of the building. The outside doors are double and are constructed of

four thicknesses of $\frac{3}{4}$ in. boards—two on the inside and two on the outside—with a $2\frac{1}{2}$ in. air space between. Two layers of waterproof paper were laid between the $\frac{3}{4}$ in. boards. The doors are hung on heavy strap iron combination hasps and hinges in sections alternating 4 ft. 4 in. and 2 ft. long. All edges closing against jambs or each other are covered with rubber canvas $\frac{1}{16}$ in. thick on a cushion of hair. The outside of the doors are covered with No. 22 gage galvanized steel for fire-proofing. To provide additional insulation at the outside doors where leakage is bound to occur two vertical rows of 3 in. channels 9 in. apart were bolted to the column on each side of the door and $1\frac{1}{2}$ in. x 10 in. plank fitted into the grooves of the channels—the space between the plank being filled with regranulated cork. The doors in the division walls are constructed of two thicknesses of $1\frac{1}{2}$ in. x 10 in. plank, each thickness fitted into channels as explained for the outside doors except that the insulation space is somewhat greater. The trap doors in the ceiling are of wood with cork insulation and are covered with galvanized steel. On the inside of all walls 2 in. x 4 in. timbers spaced 2 ft. 6 in. on centers were bolted in a vertical position and 1 in. x 4 in. drip boards with bevelled edges, were nailed to these horizontally to keep the ice and drippings away from the walls.

The question of insulation was given considerable thought. Sawdust which is used for fully 90 per cent. of the ice houses built is, at its best, an indifferent insulating material and its affinity for moisture soon renders it worthless unless unusual

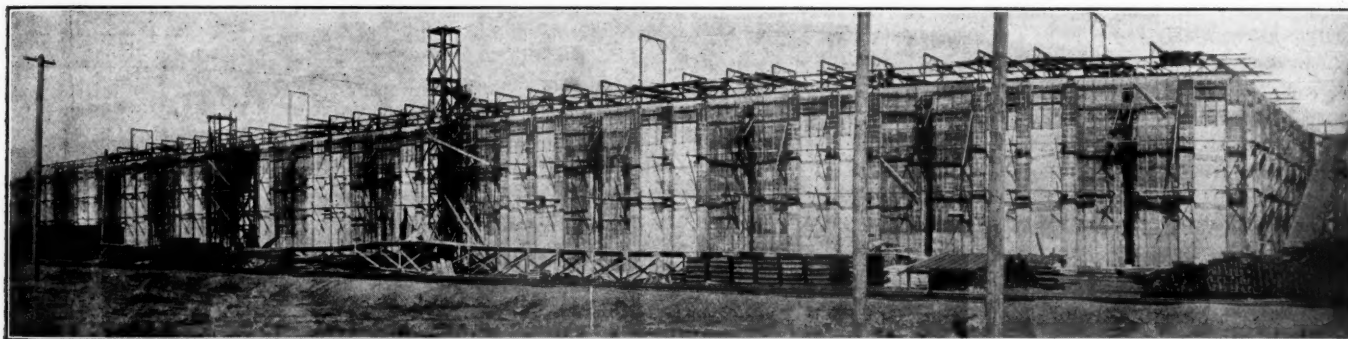
new position and used over again. With but slight repairs they lasted for the entire job and were raised on an average of twice a week. The outside forms for the pilasters were built up in 8 ft. sections and left in place for the full height of the walls, but those used to form the insulating space were made in 4 ft. sections and raised at the same time as the wall forms.

Ceiling forms were hung from the trusses and the roof forms were supported on the lower chords of the trusses by means of vertical posts.

A 1:2:4 concrete mixture was used throughout. Bank sand was obtained within a short distance of the site and a very fine grade of gravel was shipped in from a distance of 25 miles. The gravel was run through a $\frac{3}{4}$ in. screen. Trident Portland cement was used.

The contractor's plant consisted of two Smith mixers of $\frac{1}{2}$ -yd. capacity, located one on each side of the building about 120 ft. from opposite ends. A platform long enough to serve seven gondola cars was constructed for each mixer and the cement, sand and gravel were fed into the mixers direct from the cars by means of wheel-barrows. The mixers discharged into steel bucket hoists which in turn dumped into a forebay from where it was taken to the forms by two wheel push carts. A substantial staging 6 ft. wide, of 4 in. x 4 in. timbers and 4 in. x 6 in. timbers for uprights with 2 in. planking, was built along all walls.

Construction commenced in the early part of December, 1912, but considerable delay was experienced on account of difficulty



Construction View Showing Much of Timbering Still in Place

precautions are taken to keep it dry. Head end cinders make a good insulating material but it was impossible to get enough of them except for the floor. Fine regranulated cork is an insulating material of high efficiency, is moisture repellant and can be bought at a very reasonable price. For these reasons it was decided to use fine regranulated cork for insulation. After the walls were built to their full height the regranulated cork was poured into place and compacted as much as possible by tamping or rather stirring with long poles.

All column and beam reinforcement is of medium steel manufacturers' standard specifications. The column reinforcement consists of four $1\frac{1}{8}$ in. verticals with $\frac{5}{16}$ in. round ties 12 in. on centers. The verticals were put in place full length and required substantial bracing to hold them in their proper position until the concrete reached a point high enough to fulfill this function. To accomplish this, three forms made of 2 in. x 4 in. timber were used for each column reinforcing. The frames were constructed in the form of a square with a hole large enough to take a column vertical in each corner. The frames were then put on the column verticals near the ends and middle and were hoisted into place by means of a gin pole, after which they were securely braced. Wall reinforcing was made up on the ground into panels 4 ft. high and with a length equal to the distance between columns and was hoisted into place.

All forms were constructed of wood. Those for the walls and columns were made in sections 4 ft. high, a sufficient number being built to extend the full length of all walls. After the concrete had hardened sufficiently, these forms were raised into a

new position and some time was also lost on account of bad snow storms. Good progress was not attained till the first of February, but from then on the work went on rapidly and the building was delivered to the Northern Pacific about the first of June.

Considerable freezing weather necessitated the installation of steam pipes between the 4 in. walls, and the water used for mixing the concrete was heated to almost the boiling point and the proper amount run into the mixer. The correct proportions of sand and gravel were then added to the water and thoroughly mixed, after which the cement was dumped in and mixed sufficiently to insure its proper distribution. By using this method concrete was delivered from the mixer at about 90 deg. F. By taking the precautions noted above, no trouble was experienced with frozen concrete. The performance of the plant in preventing loss by melting of the stored ice has been so satisfactory that the owners consider that the economy thus secured pays good interest on the total investment made.

The work was carried on under the direction of W. L. Darling, chief engineer of the Northern Pacific, and the late W. C. Smith, chief engineer maintenance of way. Deeks, Deeks & Smith, St. Paul, Minn., were the contractors, and the consulting engineer was C. A. P. Turner, Minneapolis, Minn., who has applied for patents on this type of construction.

NEW RAILWAY IN BOLIVIA.—The Corocoro railway, a branch of the Arica to La Paz line, to the Bolivian mining center of Corocoro has been opened for traffic.

Methods of Keeping Cross Tie Records*

Means of Collecting Accurate Data of Life and Merits of Various Species of Woods and Treatments

By E. T. HOWSON

The importance of the expenditure for ties alone in the maintenance of our railways may be emphasized by quoting from the statistics of the Interstate Commerce Commission for the year ending June 30, 1911, the latest available, in which the outlay for this one item alone for the one year reached the total of \$55,172,150, or 2.99 per cent. of all railway expenditures. This amount was nearly twice that for any other item for maintenance of way other than labor. It was over three times the amount spent for rail and was greater than that spent for rail, ballast and all other track material, including, in addition, the maintenance of signals.

The continually increasing price of ties is also a cause for serious study. While ties have not increased in price as much as was predicted a few years ago, the tendency has been to climb upward rapidly. For example the annual report of the Baltimore & Ohio for the year ending June 30, 1913, contains a table showing that the average price paid for ties on this road has risen from \$0.50 in 1904 to \$0.57 in 1909, and to \$0.70 in 1913, or 40 per cent. in 10 years. Due partially to increased requirements, the total expenditure for ties on this road has increased from \$806,758 in 1904 to \$1,235,957 in 1909 and \$1,887,020 in 1913. Thus the total expenditure for ties increased 134 per cent. in the ten years from 1904 to 1913, while that for rail increased only 55 per cent. in the same period.

Surely such an expenditure as this warrants a most careful study, especially when the natural tendency is for this to increase from year to year. In past years when sufficient ties of good quality were available along the right of way the relative economy of different sources of supply was readily determined. However, today the larger portion, and on many roads the entire quota must be secured from points off the lines. It is evident that the greater the distance the ties must be hauled the wider becomes the selection of woods and sources of supply and the greater is the need of a careful analysis of the factors entering into their cost and life. Several eastern roads are now bringing ties in by water from the south. Roads in the central states are securing them from Tennessee and Arkansas and western roads have imported large quantities from the Hawaiian Islands and Japan.

In studying the relative economy of various kinds of ties, a knowledge of their service under the conditions to which they are to be subjected is as essential as data regarding their first cost and these conditions vary widely on different portions of the same system. The conditions on the Illinois lines of the Santa Fe for instance, cannot be fairly compared with those on the lines of this same road in eastern Texas where ties have a life of only a few months, or again with conditions in arid New Mexico where decay is very slow and the life is limited largely by mechanical influences. The extent to which ties are to be protected from decay as compared with mechanical wear on these three portions of the same road is obviously not the same. Likewise the tie possessing the longest life under certain conditions is not necessarily the most economical. Soft woods obtained nearby and properly treated may be cheaper in the ultimate analysis than more expensive ties possessing a longer life. Again, with the rapid depletion of the forests and the continual restricting of the limits of good tie timber, conditions are changing and the most economical tie today will not necessarily be the most economical in a few years.

With the increasing expenditures for ties and more particu-

larly for treating them as a protection against decay, the need of accurate records of the life of ties under actual service conditions has been realized and the best means of obtaining these records has been the subject of much attention within the past four or five years. However, this subject has received the greatest attention within the past year and more men are now seriously considering it than ever before. To ascertain the extent to which methods for keeping these records have been developed, a circular letter of inquiry was sent to 47 prominent roads asking to what extent they kept records of the life of ties, the nature of these records and the results secured from them. The replies of 28 roads are summarized in the accompanying table, while 12 other roads replied that they are keeping no tie record.

METHODS OF SECURING RECORDS

The methods of determining the life of ties are now passing through a rapid process of development. The first and simplest method which is still used on a number of roads, is to divide the total number of ties in the track by the number inserted in a year, giving the average life. Obviously such a method gives only general averages and furnishes no information concerning the relative values of different species of wood or the effects of local roadbed and other conditions.

With the increase in the use of treated ties the demand arose for more accurate information concerning the merits of the different treatments. To furnish this information, a number of roads mark each tie, or at least each treated tie, with some distinct symbol indicating the year it was installed. The Santa Fe started this practice as early as 1885 by stamping each tie with a branding hammer.

The system of marking each tie was a big step in advance of the previous one and today is in use on a number of prominent roads. Theoretically this provides a record of every individual tie under the actual conditions to which it is subjected and should leave nothing to be desired in the way of completeness. Practically, however, it has been necessary to rely upon records prepared by the section foremen who place and remove these ties from the track and it has been found impossible to secure accurate records from the large number of foremen employed. With such a method, and especially with the class of men commonly found in those positions today, there are as many different degrees of accuracy as there are foremen. If the original reports are in error, the final summaries and conclusions are also necessarily inaccurate.

Because of the difficulty in securing accurate reports from the section foremen, the practice of dating all ties has been discontinued on a number of roads. However, some roads still believe that they are securing reasonably accurate records in this manner. On the New York Central & Hudson River, for instance, the reports of the foremen are believed to be at least 90 per cent. correct. This is partially explained by the fact that only limited varieties of woods are used and it is comparatively easy for the foremen to distinguish them. It is found, however, that the foreign foremen have more trouble in this regard than the native, a difficulty which will increase rapidly within the next few years. Aside from the value of marking all ties as a matter of record, there is a beneficial effect upon the foremen because of their being able to determine the life of all ties removed and in the track. This advantage is believed by several prominent men in this field to justify the date marking of all ties and it is at least worthy of serious consideration.

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Due to the difficulty in securing accurate records of all ties from the average section foremen it is becoming generally realized that a more accurate system of collecting data is necessary. The Burlington and Santa Fe were the first to discontinue keeping a record of all ties and to substitute test sections with ties properly marked and inspected at regular intervals by competent men. In 1910 the Santa Fe selected one section foreman's section on each operating division and took a careful inventory of every tie under both the main and side tracks, determining, wherever possible, the year each tie was put in. Since that time a monthly report of all ties renewed has been made and an inspector from the timber treating department examines all ties removed from each test section every three months. In addition this inspector makes a close annual inspection of all ties in these special sections. In this way the character and condition of the ties taken out can be observed and more important, all ties inserted are properly marked. Due to the large number of unmarked ties which were left undisturbed in these sections when the records were started, it will be some time before full information will be available, but if this record is continued there is no reason why it should not be entirely accurate.

The Burlington began installing test sections in 1909. It was at first intended to install one special test section of 1,000 ties on each of the 19 operation divisions, but this has since been extended until as many as two or three test sections have been installed on some divisions and 26,000 ties are now under special observation. Differing from the Santa Fe plan, the ties are either renewed to face in an old track to present a continuous stretch of ties of the same age or where possible, advantage is taken of the construction of new track to place these test sections where it will not be necessary to remove the old ties. In this way each tie, at least at first, carried its full share of the load and all ties are placed upon an equal basis. The limits of these test sections are carefully marked by posts bearing brass plates giving general data regarding the tests. Two different nails are placed in the upper face of each tie about 34 in. from one end. The first letters of the alphabet are used to denote the

when the foreman makes a complete report. An annual inspection of each of these test sections is made by the superintendent of timber preservation personally, accompanied by the division superintendent, roadmaster and section foreman. This inspection is made in August and September when the fungus growth is most evident and when the weather permits of close inspection.

Other roads which have recently installed test sections include the Atlantic Coast Line; the Chicago & Eastern Illinois; the Chicago, Milwaukee & St. Paul; the Great Northern; the Lake Shore & Michigan Southern; the Missouri Pacific and the Pennsylvania Lines, while among others, the Baltimore & Ohio; the Chicago, Rock Island & Pacific and the Chicago & Alton, plan to install similar methods soon.

In making preparations for test sections, special care should be taken to secure No. 1 ties in all cases, as a few inferior ties

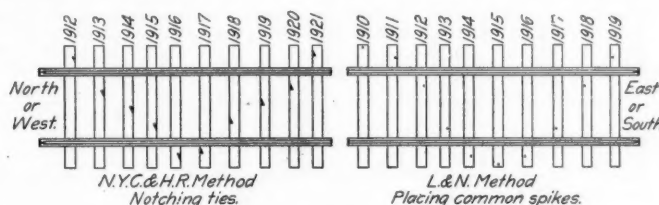


Fig. 2—Simple Methods of Dating Ties

may vitiate the entire results. Likewise, in selecting locations for tests great care should be taken to secure as representative and at the same time, as varied conditions as possible to thoroughly cover conditions existing over the system. While not essential, it is of considerable advantage to place 100 ties of each kind together so that records are at once available in terms of percentages and at the same time, no one set of ties is required to carry a portion of the load of ties of another kind which may fail early. Where only three or four ties of a kind are placed together their life may be shortened by the failure of ties beside them throwing an undue load upon them. Also, a larger

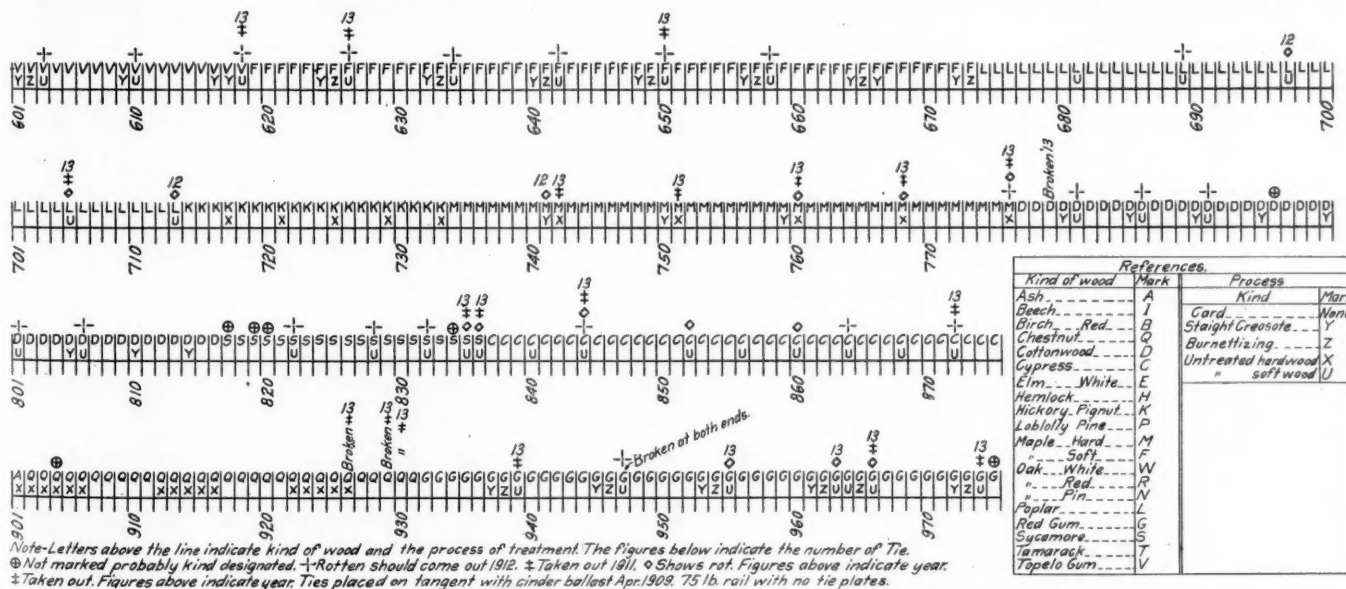


Fig. 1—Burlington Form of Recording Data on Test Sections

species of wood while the kind of treatment is denoted by one of the last letters of the alphabet. Thus a tie marked "FY" is creosoted soft maple. As the ties are installed they are numbered consecutively in white paint on the ends for purposes of comparison with blue prints which are prepared to show the characteristics of the ties in their proper order, as illustrated in the accompanying sketch. These ties are renewed only under the supervision of the roadmaster except in cases of emergency,

number of ties of each kind will give more accurate results than where only two or three are placed together, for the premature failure of one will seriously affect any results computed upon a percentage basis. The first cost of installing a test section in operated track is, of course, greater where all ties are placed together, as on the Burlington, than where the ties are spotted in as on the Santa Fe. However, this first cost of installation is almost the only additional cost as the inspection can be taken

METHODS EMPLOYED BY VARIOUS RAILROADS FOR KEEPING TIE RECORDS

NAME OF ROAD	NATURE OF RECORD	ADVANTAGES OR DISADVANTAGES	METHOD OF IDENTIFYING TIES	WHEN AND BY WHOM MARKED	ADVANTAGES OR DISADVANTAGES OF SYSTEM OF MARKING	NATURE AND METHOD OF INSPECTION	DO YOU SECURE AN ACCURATE RECORD?	LENGTH OF TIME RECORDS KEPT	USES MADE OF RECORDS	REMARKS
A., T. & S. F.	From 1885 to 1910 marked all ties. Since 1910 kept record only of special test sections.	With first method unable to secure accurate records. Much better results with special test sections.	From 1885 to 1900 branded all ties on end. From 1900 to 1910 used dating nail. Since 1910 on special sections keep careful inventory of all ties.	Formerly marked by section foremen. Now under supervision of inspector from office of manager of treating plants.	All ties in test sections now marked accurately and authentic records available.	Careful annual and quarterly inspections by a man from office of manager of treating plants.	Will eventually secure complete and accurate records by this method.	In a general way since 1885. Accurately since 1910.		Believe that end stamping of ties is more permanent than dating nail. Have numbers of 1885 and 1886 ties in track with stamping perfectly legible.
ATLANTIC COAST LINE	Test sections.		Hammer stamped.	Marked under personal direction of Supt. timber preservative when inserted in track.		Regular inspection by Supt. timber preservation.	Believe it will.	Just starting system.		Test sections will contain 500 to 1,000 ties each. One or more to a division and will include all combinations of ties and treatments that road is likely to be interested in.
B. & O.	Expect to install record soon by special sections.		Dating nail.	Marked at treating plant.		Regular inspection by representative of timber treating department.	Should do so.	Not yet installed.		Treating plant only recently completed.
BOSTON & MAINE	Keep record only of treated ties.			By section foremen on receipt from treating plant.		No inspection except on renewal.	No.	10 years.	Assists in distributing ties and determining their life on certain sections.	Keeping record only of treated ties of which there are comparatively few in track.
CANADIAN PACIFIC	Keep average record only.			Not marked.				18 years.	Records considered necessary and valuable.	No ties treated previous to 1911. Have record of total ties in track on each division and number renewed. Figure life on a percentage basis.
CHICAGO & ALTON	No record now kept. Formerly used dating nails. Expect to install experimental sections.	Difficult to secure reliable information from section foremen.	Dating nails formerly used but discontinued this year.	Formerly by section foremen.	Dating nails provided legible.		No.			Discontinued use of dating nails this year. Now planning to install special test sections with accurate records.
CHICAGO & EASTERN ILLINOIS	Dating nails prior to 1911. Test track since 1912.			Prior to 1911 by track foremen when installed.		Prior to 1911 no regular inspection.	Old system fairly accurate.	14 years.		Test track should afford much valuable information after several years.
C., B. & Q.	Test sections.		Nails.	By Supt. of plant before leaving treating plant.	Nails have been entirely satisfactory so far.	Test sections personally inspected each year by Supt. of timber preservation.	Absolutely accurate.	Record of test sections 7 years.	Not kept long enough to furnish much definite information.	Have 26,000 ties in experimental sections. Expect to secure much valuable data.
C., M. & ST. P.	Have installed 11 test sections.	In this way secure accurate reports.	Common nails with complete book record.	Roadmaster.	Formerly paid \$2,000 per year to mark every treated tie. Present method saves money and gives better results.	Annual inspection by roadmaster with report of all removals.	Yes.	Since 1903.	Records influenced selection of woods and preservative treatments.	Information on test tracks includes location, kind of treatment, number of ties, marks on ties and at base or tangent of test section, ballast, curve or tangent, tie plate, weight of rail, date ties inserted, date removed and cause.
C., R. I. & P.	Have endeavored to keep record of all treated ties. Will keep record on special sections after Jan. 1, 1914.	Foremen will not make accurate reports.	Kind of treatment designated by shape of dating nail.	Ties have been marked by section foremen when put in track.		No inspection reports made at time of removal or insertion.	No—when dependent on section foremen.	6 years.	Not used sufficiently long.	
C., C., C. & ST. L.	Every tie marked with dating nail.	Difficult to secure full and accurate reports from section foremen.	Dating nails.	Untreated ties by section foremen when put in track. Treated ties at treating plant.	Method satisfactory. Nails permanent and legible.	Inspected on removal by foremen and supervisors.	Reasonably accurate.	Since 1900.	Do not make use of them.	Value of marking ties consists almost solely in information it gives at inspections.
ELGIN, JOLIET & EASTERN	Put dating nails in all treated ties.	Foremen have put dating nails in untreated ties in a few instances.	Dating nails.	By foremen when putting ties in track.	Error in use of dating nails affects accuracy of records.		Reasonably accurate.	Since 1908.	None. Very few treated ties have been taken out of track.	Believe satisfactory tests obtained by keeping careful record of a few ties on one section.

ERIE	Keep record of all treated ties by dating nails only.	Dating nails.	By section men when putting in track.	Danger of broken nails and loss of record.	Ties inspected only at time of renewal by supervisors.	Nails used since 1910.	Of no special use yet.	Usually select new track for test sections.
GREAT NORTHERN	Formerly kept record of all ties. Now only on certain sections.	Two dating nails showing species of wood and year placed in track.	Nails showing wood applied at treating plant by supt. Nails showing year placed in track by roadmaster.	Method has proved satisfactory.	Annual inspection by representative of engineer M. of W.	Since 1903.	Gradually obtaining useful information regarding species, treatment and climatic influences.	
L. S. & M. S.	Keep record of every tie on certain sections.	Dating nails and numbered copper tags.	Chief timber inspector at treating plant.	No disadvantages found.	It is planned to make regular inspection under direction of engr. dept.	2 years.	Expect records to be exceedingly valuable.	Short test sections accurately supervised by engr. dept. should be much more accurate and reliable than records based on an entire line.
LOUISVILLE & NASHVILLE	Keep record of every stretch of treated ties in track; also know average life of all ties on each division.	Have used dating nails to a limited extent; also 3-in. spikes.		Advantage—Determination of age of any tie. Disadvantage—Cost.	Annual inspection by roadmaster and track supervisor.	At least 40 years.	For determination of life of ties only.	Impractical to keep a record of each individual tie as cost would exceed benefit derived.
MICHIGAN CENTRAL	Previous to 1912 marked ties with hammers and dating nails. In treated sections last year.	Limits of test sections shown by stakes.	By division engineer.	When checking every tie it is found impossible to retain marks for entire life of timber.	Annual fall inspection by division engineer.	9 years.	Records of white oak ties have given valuable data. Use of treated ties too limited.	Endeavor to distribute test sections over different classes of sub-soil and ballast.
M. K. & T.	Keep record of all treated ties.	Dating nail and hammer.	Hammer stamping at plant. Dating nail when inserted in track.		Annual inspection by special inspector. Reported only on removal.	13 years.		Believe road might discontinue records as we know what life to expect from treated ties.
MISSOURI PACIFIC	Installed 2 or 3 test sections on each division last spring.	Dating nails.	By section foremen when installed.			6 months.		Believe that reliable information will enable comparison of life of treated and untreated ties in this territory to be made.
N. Y. C. & H. R.	Keep record of every tie.	Notches and two kinds of nails.	By section foremen when ties are installed.	Nails provide better identification than notches.	Inspected on renewal by supervisors and foremen.	12 years.	Records necessary and will prove valuable.	Experimental section will show relative value of different woods before entire life reached thus gaining benefit of earlier information.
N. Y., N. H. & H.	Keep record of every treated tie.	Dating nail.	Section foremen at end of season.		Reports made from time to time by supervisor.	Since 1907.		
NORTHERN PACIFIC	Keep record of every tie.	Dating nail.	Section foremen as installed.		Now planned for section foremen and roadmaster to report when renewed.	Since 1907.		Consider records necessary and valuable.
PENNSYLVANIA LINES	Test sections.	Dating nails indicate species of wood and date laid.	At installation by section foremen.		Reports made annually by supervisor showing life of all treated ties removed.	Intermittently since 1898.		
PENNSYLVANIA RAILROAD	Started record all treated ties in 1909.	Started using dating nails in 1909. Discontinued in 1911.	At treating plant.	Dating nails discontinued because expensive. Heads came off and trackmen disagreed with nailer at plant regarding face of tie to go up.				Expect to select short stretches of test track.
SOUTHERN PACIFIC	Test sections.	Dating nail.	By section foremen when laid.	Dating nails will not always remain in ties.	Ties inspected on removal by section foreman and roadmaster.	19 years.		
UNION PACIFIC	Special Sections.	Dating nails placed in treated ties only.	At treating plant.				For allotment of new ties.	Prepare annual reports showing total number of each year's ties taken out of tracks and the number of treated ties inserted.

care of ordinarily by the inspectors regularly employed at the treating plants.

METHODS OF MARKING TIES

There are several methods of marking ties for permanent identification. One of the earliest was the notching of the ties, which practice is still followed on the New York Central & Hudson River for untreated ties. The position of the notch in the tie indicates the year in which it was laid, as shown in the accompanying drawing. This method affords an easy and convenient means of dating the tie without any special tools and can be performed by any foreman. However, as these notches are generally in sap wood, they soon break out or are worn off and the record is then lost.

Another method equally convenient and more permanent is that employed experimentally on the Louisville & Nashville where ordinary 3 in. spikes are driven into the tie, the position of the spikes indicating the year laid. This method is as simple as the notching and the nails should remain in the tie for their entire life. Common nails are also used to identify ties in test sections on the Chicago, Milwaukee & St. Paul.

The most common means of identification is by the use of large headed nails commonly termed "dating" nails. Where the only record kept is that of the date of installation, the nails carry impressions in the head showing the last two numerals of the year. In some instances the shape of the nail head possesses a special significance. On the New York Central & Hudson River nails with square heads indicate ties treated in the railroad treating plant, while those with circular heads indicate ties treated elsewhere. On the Chicago & Eastern Illinois, nails with square heads indicate ties treated with creosote and those with round heads indicate ties treated with zinc chloride. On the Rock Island it is also proposed to indicate the kind of treatment by the shape of the nail head. As stated above two nails are used on the Burlington to indicate the species of wood and the character of treatment, respectively. On the Great Northern and Pennsylvania Lines, two nails are used to indicate the date laid and the species of wood, respectively. The Lake Shore & Michigan Southern uses a copper tag in conjunction with the dating nail with the number on the tag referring to a detailed description of the tie and treatment.

While the steel dating nail is probably used more than any other method of identification and is generally satisfactory, it has several disadvantages. Unless galvanized, it is subject to corrosion, and even when protected in this manner the extent to which these nails will remain legible after 10 or 12 years' exposure is a matter of wide diversity of opinion. The nails have been used in very few instances sufficiently long to enable this point to be conclusively established. In common with other roads, the Michigan Central has tried copper nails to escape corrosion, but they are expensive and in some cases, were extracted from the ties. Several roads have reported difficulty with the heads of the ordinary galvanized dating nails coming off in handling ties in the cars or after insertion in the track, the larger head on the dating nail being much more liable to injury in handling than the smaller heads of the common nails used on the Louisville & Nashville. The Pennsylvania started using dating nails in 1909 but discontinued their use in 1911, due to differences of opinion between the nailers at the treating plants and the section foremen regarding the side of the tie to go up in the track.

On some roads the nails are placed indiscriminately in the top of the tie; on others they are placed in a certain position. When starting the use of dating nails in 1901 the Santa Fe placed them in the ends of the ties but the following year changed the location to the upper face of the tie 8 in. outside of the rail on the line side of the track. The New York Central & Hudson River drives the dating nails 14 in. inside of the base of rail.

One of the earliest methods of marking ties which is return-

ing to favor in the last two years, is the hammer stamping on the end. From 1885 to 1900 the Santa Fe marked all ties on the end with a branding hammer. Within the past two years air hammers have been installed on the adzing machines in the treating plants of the Delaware, Lackawanna & Western and the Philadelphia & Reading, so that the ties are stamped as they are adzed before treatment. At the Lackawanna plant the ties are marked to indicate the weight of rail for which the ties are bored and adzed and whether they are hard or soft wood, while at the Port Reading plant, treating ties for both the Philadelphia & Reading and the Central Railroad of New Jersey, the ownership and weight of rail are indicated.

With the ordinary ballasted track the end stamping is not visible without removing the ballast from the end of the tie, while the dating nail is always evident. There is also some danger of marks of the hammer branding being obliterated, by the use of mauls, picks and other tools by the track forces. However, this abuse of ties is gradually being eliminated as improved tools are provided for handling them. With proper care the hammer stamps remain legible for the full life of the ties. Many ties installed on the Santa Fe in 1886 and 1888 were marked in this manner and the brands are still clearly legible.

The place and time of marking the ties varies greatly. On many roads the general practice is to leave this to the section foreman to be done when inserting the ties. However, it is difficult to get the foremen to properly date all ties, especially with the care desired on those roads installing test sections. On these roads the practice is very general to properly mark the ties at the plant. For purposes of accuracy this latter method is to be much preferred.

SUMMARY

Special test sections are to be preferred over the universal dating of all ties or any other method so far developed, as a means of securing accurate information concerning the life of ties.

Test sections should be carefully planned to cover representative conditions, species of wood and kind and extent of treatment. They should be under the personal supervision of an experienced representative of the timber preservation or engineering department.

Where possible such sections should be laid with new ties continuously with a sufficient number of each kind of tie to secure a fair test.

For the identification of ties both the dating nail and hammer stamping are satisfactory, each possessing certain advantages.

A CONVENIENT PROCESS FOR MAKING BLACK AND WHITE PRINTS

The valuation department of the Interstate Commerce Commission has inserted in the second tentative draft of specifications for maps and profiles the requirement that all these maps shall be made on the best grade of tracing cloth by hand or by a lithographic process approved by the commission. Although generally unknown, such a process is used by at least three blue-printing companies in the United States, to reduce the cost of the preparation of such maps as compared with retracing them.

The process originally came from Germany and France, and is a secret one requiring considerable skill for its successful operation. Among the companies using it is the New York Multi-Color Copying Co., New York, and the following information is based on information furnished by this firm.

A blue print reproduction is made from the tracing to be copied on a special blue print paper, sensitized by different chemicals than are used in preparing the ordinary blue print paper. After this print is properly exposed in either sun or electric light, the printed side of the blue print unwashed is brought in contact with a gelatine plate. This plate consists of

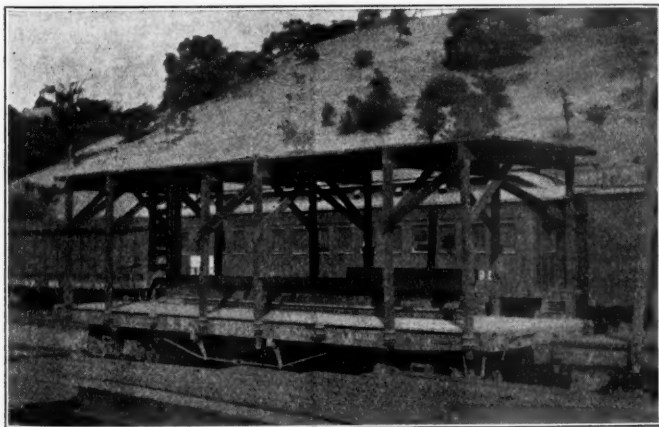
a tin sheet of any desired size over which is poured a composition of melted gelatine and dissolved chemicals. After a few minutes this solution hardens on the tin sheet. The blue print is then placed on the gelatine plate and all the lines and letters on the blue print are immediately transferred to the surface of the gelatine. This surface is then rolled with a lithographical ink roller which inks all the lines and letters while the rest of the surface takes no ink. A sheet of paper, linen, tracing cloth or cardboard, as desired, is then laid upon this sheet and a complete reproduction is transferred to it. A number of copies can be taken from the same gelatine plate, although the lines have to be inked before each impression. To secure the best results it is essential that the originals be cleaned and that they be drawn with good India ink on tracing cloth or tracing paper.

Reproductions made by this process possess several advantages. As neither the original nor the reproduction come in contact with water they are more true to scale than ordinary blue prints. They are practically unfading as the ink used is practically permanent. Also reproductions can be made on any kind of paper or cloth including tracing cloth. The cost of these prints is relatively low as compared with that of making a new tracing and depends largely on the number of copies wanted. If only one copy is required the cost is about \$0.07 per sq. ft. on paper, decreasing to about \$0.05 per sq. ft. for two copies and about \$0.03 per sq. ft. for four or more copies. The cost of reproduction on linen is about \$0.02 per sq. ft. higher than on paper, and on tracing cloth about twice as high as on paper because of certain extra steps which are required.

THE BURNING OUT OF A TUNNEL ON THE SOUTHERN PACIFIC

The Coast division of the Southern Pacific suffered a disastrous tieup on September 17, 1913, as a result of the burning of tunnel No. 7, about 12 miles from San Luis Obispo, Cal., midway between San Francisco and Los Angeles. This tunnel is 1,371 ft. long, with a 10-deg. curve on each end, connected by 600 ft. of tangent, and is on a 2.2 per cent. compensated grade. The tieup resulting from this fire extended until November 7, when the tunnel was reopened for traffic.

The fire originated from a camp fire built on the right of way by tramps. In addition to burning out the tunnel the fire spread

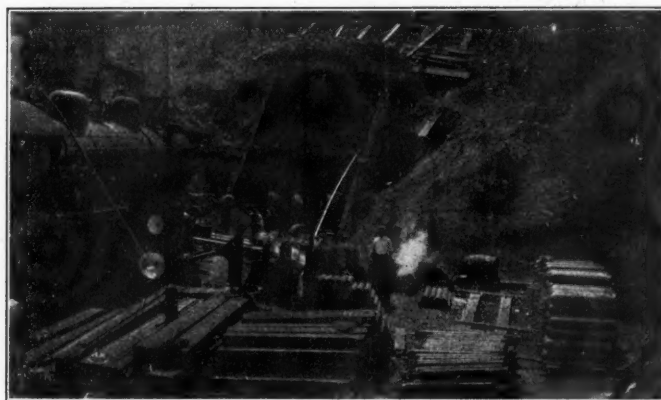


Staging Car Used in Placing Timbers in Tunnel

over an area of between 1,000 and 1,500 acres of brush and grass. As soon as word of the fire was received from the section foreman, water trains with all available men were sent from San Luis Obispo at 3 o'clock on the afternoon of September 17, but the fire had secured too great headway and the water was ineffective. In the meantime all carpenter gangs available had been rushed to this point and both ends of the tunnel were sealed, the west end being closed at 4:30 and the east end at 10 o'clock the following morning. After the tunnel was sealed, steam supplied by locomotives was forced into the tunnel for 72 hours.

At the end of this period it was discovered that the steam was to some extent penetrating and dissolving the rock, which is of an argillaceous formation.

After small caveins occurred it was decided to discontinue the use of steam and carbon dioxide gas was forced into the tunnel for the purpose of extinguishing the fire. This was continued for 11 hours, but it was not considered advisable to un-



View at the West End on September 24, Showing Battery and Stock of Carbon Dioxide

seal the tunnel until 24 hours later. Accordingly, at 7:30 a. m., September 22, the seals were broken. As soon as this was done the portal at the west end caved in. Steps were immediately taken to remove this material, but the smoke, gas and heat were intense and increased until it was generally conceded that the fire was still burning in the tunnel. It was then decided to reseal the tunnel and inject more carbon dioxide. The temperatures at the east and west ends of the tunnel at 3 a. m., September 23, when it was resealed, were 302 and 190 deg. F., respectively. Tests for gas and temperature were regularly made until 7:30 a. m., September 25, at which time the temperature had fallen to 176 and 118 deg., respectively. It was decided that



Seal at East End of Tunnel

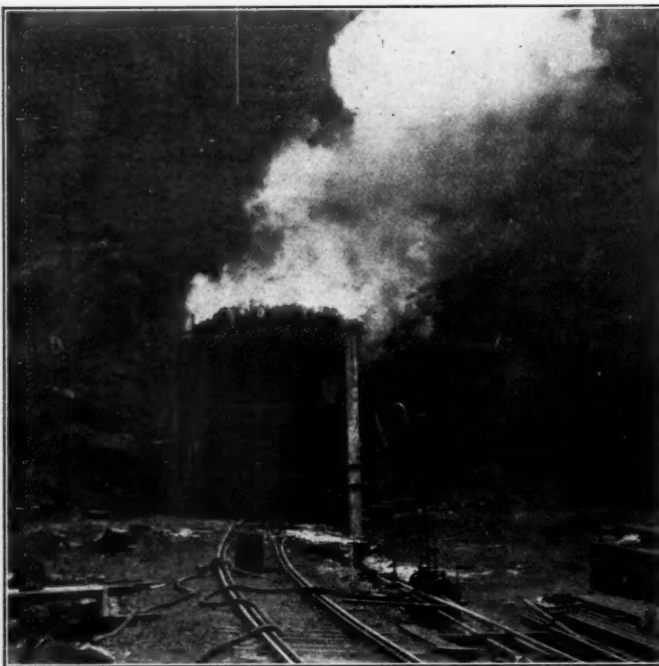
the fire could not still be alive. The seal in the west end was therefore removed and an attempt was made to erect a bulkhead 216 ft. from the portal, but the intense heat and the gas fumes drove the men back. Further attempts to construct bulkheads 200 ft. and 60 ft. in met with the same results.

The temperature at the east end showed that some scheme must be devised to draw the heat and gas away from the west end. Therefore a chimney 3 ft. by 4 ft. by 24 ft. was built and erected on top of the seal at the east end to create a draft in an en-

deavor to draw the gases out of the tunnel so that work could be pushed at the west end. For a while smoke and gas rose through the chimney with the steam, but they also continued to move out of the west end of the tunnel as well. During this time a steam shovel had been set up at the east end ready to remove the falling debris, and it began work about noon of September 27. After it had removed about 250 cu. yd. of material the heat became so intense that it was feared that fire might start again in the timber in the west end of the tunnel and a wooden screen was erected to shut off some of the draft. However, it was necessary to keep a stream of water playing on this screen almost continuously to prevent it from burning.

Upon the arrival of two experienced firemen with oxygen helmets from San Francisco, it was decided to break down the half finished bulkheads and substitute a bulkhead on a push car, behind which the fire might be fought with water and chemical extinguishers. To enable the men to work in the tunnel an air line with breathing nozzles was constructed and advanced with the water line. As the car was advanced, debris on the track was first thoroughly soaked with water and then cleared off. Water was also played on the roof, dislodging the loose lagging and rocks and making it safer to work beneath.

As the car advanced into the tunnel 400 or 500 ft. the heat became more intense and the smoke hovered near the track, making it difficult for the men to come from the portal to relieve those working on the car. At times it was necessary to relieve the men at intervals of five minutes. The playing of water on the debris at a point about 350 ft. in continued until 1:30 a. m., September 28, when the heading at this point suddenly burst into flames again and the men had to make a hasty and perilous retreat. About 6 o'clock in the morning it was realized

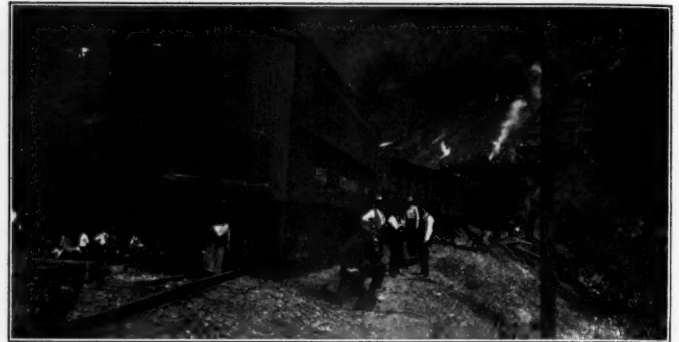


The West End of the Tunnel on the Morning of September 28

that the fire was again beyond control and all efforts were devoted to saving lumber piled near the portal. At 3 p. m. the bore was closed, except for a small hole at the top through which heavy black smoke and steam escaped. Slides had come in from three directions, bringing down about 10,000 yd. of material, which completely blocked the tunnel and shut off the draft. At the same time the west end portal had almost entirely caved in, but it was not until the morning of September 30 that a steam shovel could be started cleaning it out.

In the meantime temporary portal timbers had been erected on the east end, and the track gangs were engaged in cleaning out the muck and replacing the distorted rail with new rail.

This work was dangerous and difficult, with temperatures ranging as high as 160 deg. F., for several days. While water was used extensively to cool the floor of the tunnel, it increased the danger from falling rocks. The illumination also gave trouble. Carbide lights were used at first, but because of the heat and the fact that they were being handled by inexperienced men, the



Pumping Steam into the East End of the Tunnel

danger of explosion was such that electric lights were installed.

During this time work was also progressing at the west end; the steam shovel had cleaned out the slide at the portal and the rock had cooled off sufficiently to permit the temporary placing of portal timbers. Inside the tunnel the temperature of the rock in the roof was as high as 274 deg. at a point 120 ft. in, setting fire on one occasion to the new temporary portal timbers. It was not until October 15, that the segments of the timbering could be placed at this distance from the portal.

On the morning of October 17, a large slide occurred 393 ft. in from the east end, filling up 24 ft. of the tunnel. It was then decided to abandon ordinary methods of mucking and to drive a 6 ft. by 6 ft. drift through this slide at an elevation such that timbers could be placed, permitting a permanent concrete arch to be built. This drift was driven in three days under unusually severe conditions, the temperature being as high as 147 deg. F. The timbering and removal of the remainder of the cavein were prosecuted under unusually difficult circumstances continuing until early in the morning of November 7, when the last timbers were placed and a work train passed through the tunnel, regular trains following soon after.

As soon as the fire was discovered steps were taken to transfer passengers and baggage around the tunnel. A new trail 3,200 ft. long was built on a practically level grade and transfers made without serious inconvenience until the line was reopened.

In reopening this tunnel, 11,780 cu. yd. of material was removed. Of this amount, 2,090 cu. yd. was taken from the large slide and the rest was material which had dropped from the roof and walls. About 206 sets of timber were erected. The maximum number of men employed at one time was 343, and the average number 250. One work train was employed at each end of the tunnel continuously, day and night, and an additional engine was required in the early stages of the work when water was being extensively used. Toward the close of the work, switch engines were set out on spurs and were used as stationary engines to supply steam to operate the Pyle electric generators for electric lights and the pumps providing water in the tunnel. Air blowers with 12 in. pipe lines were installed at each end, operated by gasoline engines. Telephones were installed at each end of the tunnel, and also inside as the work advanced.

Intermediate timbers have now been erected and forms for the concrete portals are now being placed. It is proposed to build 100 ft. of concrete tunnel at the west end, 50 ft. at the east end, and 100 ft. at the point about 900 ft. in from the east end, where the largest slide occurred. The estimated cost of renewing the timber lining and placing the three sections of concrete is \$120,000.

We are indebted to T. Ahern, division superintendent of the Coast division for the above information and photographs.

American Wood Preservers' Convention

Abstracts of Papers Read at the Tenth Annual Meeting Held in New Orleans, with Resume of Discussions

The tenth annual convention of the American Wood Preservers' Association was held at the St. Charles hotel, New Orleans, on January 20, 21, 22, 1914. The officers of the association for the past year were: President, A. E. Larkin, manager, Republic Creosoting Company, Minneapolis, Minn.; first vice-president, J. H. Waterman, superintendent of timber preservation, Chicago, Burlington & Quincy, Galesburg, Ill.; second vice-president, E. B. Fulks, vice-president and general manager, Anglo-American Tar Products Company; third vice-president, George E. Rex, manager of treating plants, Atchison, Topeka & Santa Fe, Topeka, Kans., and secretary and treasurer, F. J. Angier, superintendent of timber preservation, Baltimore & Ohio, Baltimore, Md.

The convention was called to order with about 100 members and guests present by President Larkin, and was welcomed to New Orleans by Mayor Behrman and by A. M. Shaw, president of the Louisiana Engineering Society. J. H. Waterman responded for the association. In the president's address Mr. Larkin referred to the universally increasing interest in wood preservation, especially among cities and railroads. He emphasized the fact that advancement of the work of the association is dependent upon co-operation of all the men in this industry, and stated that the progress of the industry is retarded today by poor work done by some concerns. The report of the secretary and treasurer showed an increase of 26 members during the past year and a total membership of nearly 200. The finances were reported in satisfactory condition. The report of the committee on preservation was then presented, this report being largely a compilation of portions of specifications for treating materials and methods of testing adopted by other associations. A paper was presented on creosote oil by P. C. Reilly, president of the Republic Creosoting Company, strongly advocating the use of creosote without coal tar or other adulterations and showing the effects upon penetration into timber or coal tar. Doctor S. H. Vonschrenk presented a paper upon the same general subject in which he advocated the use of poor creosote for treating timber whenever it could be secured, as it was cheaper in the end, but advocating the addition of coal tar to second and third grade oils instead of using larger quantities of these poorer oils. These two papers aroused active discussion.

A paper on "Preliminary Work in Fireproofing Wood," was presented by Robert E. Prince of the Forest Products Laboratory, Madison, Wis. This paper described some preliminary tests made for the purpose of determining the relative value and efficiency of various chemical compounds in rendering wood non-inflammable or slow burning. The results of these tests show that of the eight species of untreated woods under observation, tamarack was the most fire resistant with red wood next, even though western larch and noble fir were slower to ignite than red wood.

In studying treated woods the following conclusions were drawn:

Ammonium salts are of considerable value in fireproofing wood. It was impossible to ignite wood, under the conditions of test, that had been treated with these salts.

Borax is of considerable value in fireproofing wood. It has not the value of the ammonium salts, but promises a means of lessening the cost of treating by using it with another salt of greater value.

From the good results already obtained it appears possible to devise a reasonably inexpensive method of rendering wood fire-retarding.

The above conclusions were based upon preliminary experiments only which are still being continued.

F. Ridgway, chemist of the International Creosoting Company, read an interesting paper on the service of piling in Galveston causeway bridge of Atchison, Topeka & Santa Fe, treated in 1875 and 1895, and removed in 1913. An abstract of this paper will appear in a later issue. The rest of the Wednesday morning session was devoted to wood block pavements.

THE PROTECTION OF TIES FROM MECHANICAL DESTRUCTION

BY HOWARD F. WEISS

Director, Forest Products Laboratory, Madison, Wis.

In 1907 the American Railway Engineering Association sent out a number of letters asking various railroad engineers what per cent. of their ties failed from decay and what per cent. from mechanical destruction. The replies in general were that about 90 per cent. of oak ties failed because of decay, as against 25 per cent. of cedar. In other words, the mechanical destruction of the ties varied from a minimum of about 10 per cent. for oak to a maximum of about 75 per cent. for cedar. The many good results which have been and are being secured by timber treating engineers in protecting ties from decay are placing each year a larger per cent. of our ties in the cedar class in so far as their mechanical life is concerned. This means that the problem of mechanical protection is one of increasing importance. It is a waste of preservative, effort and money to inject into ties an amount of preservative which will protect ties beyond their mechanical life because after the tie has once failed mechanically it is removed from the track and destroyed.

The protection of ties from rail wear is secured by means of tie plates. These serve two primary functions: the protection of the tie from the crushing and pounding action of the rail due to the passage of rolling stock; and protection from the grinding action of the rail caused by its tendency to creep and vibrate.

A great variety of plates has been advocated to protect ties from destruction. They may be classed, however, as wood and metal plates. The former are rather extensively used abroad, and are also under test in this country. From the experience which we have had with them in different test tracks laid in co-operation with American roads, the results have not thus far been satisfactory.

More satisfactory results have thus far been secured in our experiments at least with metal plates. These vary considerably in form, but may be classed into two types, viz., pronged or ridged plates and flat plates. The object of the former class is to imbed the plate in the tie, thus making it a part of the tie and assisting the spikes in resisting rail spread. The chief disadvantage we have noted with this type of plate is its tendency to gouge into the wood and at times completely destroy it. The untreated interior of the tie is thus exposed to the weather, and decay is readily admitted. Flat plates do not have this objection, but are troublesome at times in that they become loose and rattle under the rail. Furthermore, they simply rest upon the tie and offer no reinforcement to the spike against lateral thrust.

A feature in tie-plate construction which has perhaps not been given the serious attention to which it is entitled is the size of plate for the kind of tie on which it is to be placed. As is generally known, the various woods which are now manufactured into crossties differ very appreciably in hardness and in crushing strength. If cedar ties are interspersed in a track with white oak ties and the same sized tie-plates are placed upon both, the cedar ties are going to fail from mechanical destruction far more quickly than the white oak ties. That track is best laid which makes each tie carry its proportionate share of a passing load;

therefore, to secure best result, tie-plates should be so designed that the unit loads placed on various kinds of ties will be approximately the same. Perhaps best results are secured by placing in the track ties of uniform hardness, at least in given stretches.

TABLE I.—CRUSHING STRENGTH OF CROSS TIES IN PER CENT. OF WHITE OAK

Kind of Tie.	Fiber stress at elastic limit perpendicular to grain. Lbs. per sq. inch	Fiber stress in per cent. of white oak, or 853 pounds per sq. inch.
Honey Locust.....	1,684	197.5
Black Locust	1,426	167.2
Post Oak	1,148	134.6
Pignut Hickory	1,142	133.9
Water Hickory	1,088	127.5
Shagbark Hickory	1,070	125.5
Big Shellbark Hickory.....	997	116.9
Bitternut Hickory	986	115.7
Nutmeg Hickory	938	110.0
Yellow Oak	857	100.5
White oak	853	100.0
Bur Oak	836	98.0
White Ash	828	97.2
Red Oak	778	91.2
Sugar Maple	742	87.0
Rock Elm	696	81.6
Beech	607	71.2
Slippery Elm	599	70.2
Redwood	578	67.8
Bald Cypress	548	64.3
Red Maple	531	62.3
Hackberry	525	61.6
Incense Cedar	518	60.8
Hemlock	497	58.3
Longleaf Pine	491	57.6
Tamarack	480	56.3
Silver Maple	456	53.5
Yellow Birch	454	53.2
Tupelo	451	52.9
Black Cherry	444	52.1
Sycamore	433	50.8
Douglas Fir	427	50.1
Shortleaf Pine	400	46.9
Red Pine	358	42.0
Sugar Pine	353	41.4
White Elm	351	41.2
Western Yellow Pine.....	348	40.8
Lodgepole Pine	348	40.8
Red Spruce	345	40.5
White Pine	314	36.8
Engelman Spruce	290	34.0
Arbovitae	288	33.8
Large-tooth Aspen	269	31.5
White Spruce	262	30.7
Butternut	258	30.3
Buckeye (yellow)	210	24.6
Basswood	209	24.5
Black Willow	193	22.6

I have taken as my standard for comparison with other woods a white oak tie. You will notice that a number of woods are stronger than white oak, and hence the size of tie-plate which they would require would be smaller than that required by white oak. On the other hand, most of the ties have less crushing resistance than the standard white oak tie, and for this reason require larger plates. It might be claimed that the property of hardness or strength should be considered in fixing the price of cross ties; that is, ties which have a low crushing strength, and which consequently require a large-sized tie-plate in order to be protected from mechanical destruction, should, other things being equal, sell at a lower price in an untreated condition than similar ties which are heavier and which offer greater resistance to mechanical destruction. If this principle were carried out in practice it would result in some cases in a readjustment of tie-plates. It is felt that such a readjustment is warranted from the standpoint of efficient track maintenance.

The question has frequently arisen, "What effect have the different preservative processes upon the strength of ties?" This matter has been investigated by Dr. W. K. Hatt at Purdue University, and he found that the difference in strength between treated and untreated ties, except in the cases of those treated with crude oil, is so slight as to make this a matter of little practical importance. Of course, this statement assumes that the ties are properly treated and are not injured by excessive heating or other causes.

The function of spikes is to hold the rail to the tie, which, analyzed, means that they must exert a resistance to pull and resistance to lateral thrust. The cut spike is by far the one most generally employed in this country. It is cheap, enables a quick

laying of the rail, and is easily applied. When freshly driven in sound, heavy timber it also gives very satisfactory results. It has, however, been subject to severe criticism because it frequently becomes loose in ties and under such condition may cause an unsafe track.

The screw spike has been most successful thus far in removing the chief criticism levied against the cut spike, viz., its low holding power. Screw spikes, however, are more costly than cut spikes and more difficult to insert in the track. Their use, however, is growing and will doubtless continue to do so, as this form of spike possesses considerable merit. In a large number of tests made at Purdue University, a part of which were conducted by the Forest Service, it was found that screw spikes had from 1.7 to 3.8 times the strength of common cut spikes against pull, and from 1.2 to 2.4 times the lateral resistance of the common spike. In round numbers one screw spike is about as efficient as two cut spikes so far as holding the rail to the tie is concerned.

The large number of ties cut from comparatively soft woods, such as loblolly pine, have encouraged certain roads to experiment with hardwood dowels. These are simply plugs of hardwood, such as red oak, usually creosoted, screwed into the tie. The spike is then driven or screwed into this hardwood dowel. By this method a very firm grasp of the rail to the tie is secured, and should the spike become loose and worn, the hardwood dowel can be unscrewed from the tie and a new one inserted. Of course, such a method of treatment is expensive; and, furthermore, it has a disadvantage in that it weakens the tie unless the ballast is kept in very good condition. Where it has been put to practical test this method has, however, yielded very satisfactory results.

The adzing and boring of ties is a feature of preparing ties for service which is also of comparatively recent origin in this country. As by far the larger majority of cross ties now in use are hewn, the problem of securing a uniform bearing of the rail or tie-plate on the tie is of great importance. In order to secure best practice it is absolutely essential to have the rail or tie-plate bear uniformly on the tie and unless the ties are adzed this result is rarely accomplished. Adzing is, therefore, strongly recommended, particularly on hewn ties, and the proper time to adz is before the ties are treated, and not after. While the mechanical adzing of ties is still in its infancy, it is quite likely machinery to do this work will become a part of the well-equipped tie-treating plant.

Another feature in too limited use at present is the boring of the ties for the insertion of spikes. When screw spikes are used it is absolutely essential to bore a hole into the tie in order to insert them, and if this hole is bored after the tie is treated the unprotected interior is more or less exposed to decay. Boring should, therefore, be preferably done before the ties are treated. Even with the ordinary cut spike, boring is of direct value.

DISCUSSION

C. M. Taylor, P. & R., advocated boring and adzing ties before treatment to prevent mechanical wear, and urged co-operation with other departments to devise means to reduce this destruction. G. E. Rex, A. T. & S. F., stated that it has been proved that ties can be effectually protected against decay if properly inspected before treatment and then properly treated. He advocated adzing and boring ties before treatment to protect them against mechanical wear, especially when only sap wood is penetrated by the preservative. Driving cut spike is destructive to wood fiber. Recent tests show that single pointed spike is less destructive than chisel point. At least 40 per cent. of rail breakages last year were base failures, due largely to improper bearing. Mr. Rex also strongly advocated sawing the ends of ties to detect unsound timber, stating many ties treated in recent years have been unsound before treatment. Records for three years show that it costs 1.6 cents per tie to adze and bore ties.

FUTURE TIE MATERIAL IN THE UNITED STATES

By H. H. GIBSON

Editor "Hardwood Record," Chicago

In round numbers, 125,000,000 cross-ties are needed yearly. This is equivalent to 4,000,000,000 board feet. The ties cost the railroads approximately \$15 per thousand feet, B. M. A casual examination of cross-tie statistics will suffice to show that a few woods are furnishing most of the material, although the forests of the United States contain over 500 different species of wood. It might be supposed that when the few woods which now are furnishing the bulk of the ties become scarce, the tie-cutters can simply switch off to some of the 500 other kinds and go on cutting. That would be a simple solution of the problem if it were practicable, but serious obstacles are in the way of doing it. Four out of five of the forest trees of this country, taken as they come, are unfit for any kind of cross-ties, and must be left out of all consideration, both for the present and in the future. They are either too small or too scarce.

The kinds of wood and the number of ties bought in 1911 by steam and electric roads in this country are shown in the list which follows:

Oak	59,508,000	Hemlock	3,686,000
Southern Pine	24,265,000	Redwood	1,820,000
Douglas Fir	11,253,000	Gum	1,293,000
Western Pine	2,696,000	Maple	1,189,000
Cedar	8,015,000	Beech	1,109,000
Chestnut	7,542,000	All others	2,682,000
Cypress	5,857,000		
Tamarack	4,138,000	Total	135,053,000

Nearly half of the ties are oak and about half of the remainder are pine. These two woods constitute 65 per cent. of the total. The largest demand is made on oak, because it has been regarded as the best tie wood, all things considered; and the first indications of diminishing supply are seen there. The railroads can still buy all the oak ties they want if they are willing to pay the price; but the contractors are obliged to go farther to get them, to take a little lower class of trees, and to charge more for the ties. There is no question that oak in this country is being cut much faster than it is growing, and it is only a matter of time until scarcity will be felt everywhere.

The second important cross-tie source is pine. The four southern yellow pines are considered best in the pine class, and long leaf pine, being harder and more durable than the others, is at the head of its class. This is the tree commonly known as Georgia pine, hard pine and heart pine. Two other southern yellow pines are largely cut for ties, short leaf and loblolly. They are softer than long leaf pine and decay more quickly when exposed to the weather. Statistics do not show the relative numbers of ties cut from the different southern yellow pines, but all are important. Long leaf pine grows slowly and reproduces poorly. When present forests are cut little more need be expected from that tree. The situation is much the same with short leaf pine, but not with loblolly, of which more will be said in a future paragraph.

It is thus seen that white oak and southern yellow pine, which at present are the chief sources of ties, are being depleted. The process is not so rapid as to call for immediate alarm, but the tendency is unmistakable. Much northern white cedar remains, but its growth does not half make good the cut, and any increased demand would quickly bear results in lessened supply. In other words, there is not enough of this cedar to last long if tie-cutters should undertake to make good there what they will soon lose in white oak. The same holds for hemlock and tamarack. They are as important now in the tie business as they will ever be, but they may hold their own for some time. Chestnut is a substantial tie material, but it is now passing through a crisis on account of the blight, and no dependence for the future can be placed in it. The situation may be summed up in a way to show that the trees which now furnish the bulk of ties, and have done so for years, cannot do so much longer. Ties,

however, must be had, and new sources of their supply must be found.

Douglas fir, western yellow pine and redwood are abundant in the far west. They are supplying about 16,000,000 ties a year now, and for years to come they could furnish all the railroads of the United States. In fact, there is enough of these three woods on the stump now to supply all the ties wanted for 200 years, provided the demand would not increase above what it is now. Two factors stand in the way of turning Douglas fir, western yellow pine and redwood over to the railroads as a reserve source of ties. The wood is needed for other purposes, and it is so far away from the majority of the railroads that the cost of the 2,000 or 3,000 mile haul would be prohibitive. The railroads must find ties closer home, if possible, for as long as possible.

In a preceding paragraph it was shown that the average cost of ties, when bought by railroads, was about \$15 per thousand feet, B. M. It happens that the average value of sawed lumber in the mill yard is practically the same, taken for the whole country. The value quoted for the ties applies when delivered on the right-of-way, which is generally near the place where they are to be used—their ultimate market. The lumber, on the other hand, is valued in the mill yard, the point of production, which averages about 300 miles from its ultimate market. The important point to bear in mind is, in making this comparison, that cross-ties, foot for foot, are cheaper than lumber, though the difference is small. This amounts to approximately the freight on a 300-mile shipment of lumber; that is, an operator can get a little more for his logs reduced to lumber than if he made them into ties, but the difference is not large enough to pay for sawing the ties, otherwise tie lumber would be sawed into lumber. This phase of the situation is somewhat modified by the fact that ties are often made of timber of such small sizes or otherwise of such inferior grades that if converted into lumber it would not be very valuable. This is really a fortunate phase of the situation, because if railroads were compelled to buy ties made of oak fit for quarter-sawing they could not afford to touch an oak tie.

As far as absolute scarcity of tie timber is concerned, it will be many years before railroads are unable to get some kind of ties if they are able and willing to pay the price; but the time is not far off when the manner of providing ties for the railroads will need radical revision. The revision has already begun, and its basic principle does not consist so much in searching for new woods as in treating with preservatives the old woods to make them last longer. The salvation of the railroads lies in that direction. They must get along with fewer ties by making them give longer service.

Some of the leading railroads anticipated tie shortage some years ago and undertook to plant trees and grow the necessary timber. The move was commendable and deserved better success than attended it. In the first place, not enough planting was done to make a "drop in the bucket." Had all the trees done well they would not have furnished enough ties to amount to much; but there were other troubles. In the east the planted locust was eaten up by beetles; the chestnut was threatened or attacked by blight. In the south the catalpa was a fizzle; and the eucalyptus plantations on the Pacific slope are still in the experimental stage.

The reasonable thing to do is to treat all cross-ties with preservatives to make them last longer. By doing that the demand can be cut down nearly one-half, because a properly treated tie lasts nearly twice as long as one in its natural state, depending of course, on the kind of wood. Preservative treatment is neither new nor experimental. In 1912 there were 112 treating plants in the United States, nearly ninety of which were well equipped. Steam railroads operate twenty-two plants for treating their own cross-ties and other timbers. In 1911 31,141,231 cross-ties were treated in this country, and it is interesting to

note the various woods making up the total. The following table gives the information:

Southern Pine	11,606,392	Lodgepole Pine	92,158
Oak	9,433,002	White Pine	78,273
Douglas Fir	3,628,706	Hackberry	62,568
Western Pine	1,789,026	Chestnut	47,538
Gum	1,182,095	Sycamore	32,244
Tamarack	755,414	Cedar	26,000
Beech	730,328	Hickory	21,441
Birch and Maple	620,047	Walnut	2,000
Hemlock	535,255	Ash	1,390
Elm	292,008	Cherry	674
Spruce	102,808		
Cypress	101,864	Total	31,141,231

The tendency is apparent in the above table. The treatment is being applied to woods which decay quickly without it, thereby drawing upon new sources of supply. The reports do not specify, yet it is well known that most of the nine million and more oak ties which passed through the treating plants were in the red oak or black oak class. These woods in the natural state decay quickly when laid in tracks; but treatment lengthens their life. Nine million red oak ties lessens the drain by that much on the white oaks. Even such woods as gum, beech, elm, white pine, sycamore and hickory make good ties after being passed through the preserving tanks.

In that direction lies the hope of the situation. Ties can be made of timbers heretofore regarded as scarcely worth cutting for that purpose. Practically every tree that grows in this country, if large enough, is good for ties, if treated. If very soft, like buckeye, aspen and white pine, plates can be used under the rails to prevent rapid wear. Viewed in that light, the tie situation is not particularly discouraging. Some of the old tried woods are becoming scarce, but dozens of others heretofore hardly used are available with the aid of the treating tank. A practically clean sweep can be made of all trees on a tract, provided they are of suitable size. That will bring ties to the tracks which heretofore were left as an encumbrance on cutover land. Utilization will be closer, waste will be less. It will not be a question of finding new sources of tie material, but of making better use of well-known sources. It costs more to treat a tie than to use it untreated, and for that reason woods which naturally last well will continue to be sought; but when they can no longer be found, or cannot be procured except at a price exceeding that of cheaper woods that have been given treatment, the cheaper woods will come in.

The time will doubtless arrive in the United States, as it has already come in France and Germany, when ties will be cut from planted timber; but that time is a good while in the future. A little planting has been done, and is being done, but for many years the railroads must look to natural woodlands for ties. Nature is still able to plant trees in this country much faster and more cheaply than man can do it, but Nature needs man's help in caring for them after they are planted and have begun to attain their growth.

Some of the species which hold out promise as sources of ties because they grow rapidly, reproduce readily, take preservative treatment easily and have extensive ranges, are loblolly pine in the south and white pine in the north; willow oak in the south and red oak in the north; and the cottonwoods and willow in the south and middle west. Loblolly pine in particular is promising because of its wide range, vigorous growth, dense stands, phenomenal reproduction and the value of the wood. Willow oak on fertile southern land grows nearly as fast as loblolly. It is in the red oak class. Black willow on good land grows as fast as either.

In the far west the tie problem is not serious. The pines and firs already of tie size are sufficient for all needs for many years; but, none the less, preservative treatment is as essential there as in the east; and it may be safely predicted that before many years but few untreated ties will be laid anywhere in the United States.

TREATMENT OF PILING AND TIMBER ACCORDING TO CONDITIONS OF USE AND EXPOSURE

By E. L. POWELL

Vice-President American Creosote Works

The greatest damage to the wood preserving industry is caused by some real failure of treated material. Such failures have been far too numerous and are undoubtedly due in very large part to the desire of treating companies for business during the dull periods. Without doubt the wood preserving company is usually in a far better position to draw up specifications than the engineer, and it is of great importance that the two work together constantly to secure the best results. The wood preservers should control treating methods, at least to the extent of seeing that no material is treated under improper specifications when the conditions under which the material is to be used are given proper consideration.

The amount of preservative required is directly affected by the kind of soil, whether wet or dry, and the climate in which the timber is to be used, as well as by the character of timber to be treated and the mechanical wear to which it will be subjected. Ties to be used in hot, wet countries require a different treatment from those to be used in a cold climate or arid region. The treatment for piling and lumber should vary also, and the treatment of such timbers to be used in teredo-infected salt water must be radically different from timber used in fresh water, swamp land, cold or arid regions.

It should be possible for the treating company to secure full information concerning the conditions under which the material is to be used, and, if necessary, the company should refuse the business unless the buyer is willing to have the material treated properly and sufficiently. At least the buyer should be fully informed in writing of what is needed to prevent future troubles when failure of the timber occurs. The buyer will usually appreciate the information and a correction can be made without causing friction or hard feeling. I have had several cases of the kind and have always found it good policy to handle these matters in a personal interview with the engineer. He can then send the required amendment without having to publish his error if he so desires.

SOME FACTS WHICH I HAVE GATHERED FROM OBSERVATION AND INSPECTION OF EXPERIMENTAL TIES

By J. H. WATERMAN

Superintendent of Timber Preservation, C. B. & Q.

There are over 26,000 experimental ties in track on the Burlington, most of which were laid in 1909, so that we have had only four years' actual experience with them. I have reported to our people that in the next ten or fifteen years I will be able to tell them something about the actual results which may be obtained by properly treating ties. However, I am optimistic enough to say that a large percentage of the treated ties, will be in track 12 to 15 years, and I will not be surprised to find some of them giving longer service than that. After four years' service in track, not one tie treated with any process has been taken out on account of decay, although a few ties have been taken out because they were broken and split. The untreated ties of the various woods would all have been out now if it had not been that they were scattered through or laid alternately with treated ties and the treated ties carry the load. As it is over 80 per cent. of the untreated ties laid in track in 1909 have been taken out on account of decay.

In 1900 we laid 550 ties out of face on the Deadwood line at a point near Mystic, S. D., on a 3 per cent. grade and a 12 deg. curve. For the past five years we have been running Mallet engines over this track. I inspected these ties on September 4, 1913, and found all of them in track except 21. Eighteen were taken out in 1912 on account of rot, and three were taken out for laboratory test. All of the ties gave 12 years' service. These

ties were red oak, treated with zinc chloride, treated at our tie plant, then located at Edgemont. There is no question but that 80 per cent. of these ties will give us over 15 years' service. The ties were not tie plated when first laid. Since the ties were put in the rail has been changed once. I will be very much disappointed if 50 per cent. of these ties do not give us 20 years' service.

Between Sidney, Neb., and Petz, Colo., we have 14 miles of track, which was laid with pine ties, treated in 1900. I inspected this track September 2, 1913, and over 95 per cent. of them were still in track. These ties were treated at our own plant with $\frac{1}{2}$ lb. of zinc chloride per cu. ft. Only the curves are protected with tie plates.

These places have a dry climate, and lead me to conclude that where one can treat ties with zinc chloride for ten cents or less per tie and they are to be used in the dry climate of western Nebraska, Colorado, Montana, South Dakota or climates similar to that, this treatment will surely give satisfaction. We will have to wait patiently to find out whether the treatments with oil in that climate will give us better service or not.

Between November 15, 1903, and February 5, 1904, the Burlington laid ten miles of track between Concord, Ill., and Jacksonville, with red oak ties treated with zinc chloride. In this track there were laid 35,000 ties in round numbers. To date 21,000 of the above ties are still in track. In other words 60 per cent. of these ties have given us 10 years' life, and over 90 per cent. of these ties gave us nine years' life. These ties were laid in the winter on a new grade that was frozen, and have had very hard usage. They were not tie plated. I saw many of the ties which were taken out last year, not because they had decayed, but because they were simply mechanically worn out with the rail. On account of recommendations which have been made to our people, all treated ties are now tie plated when put in track.

The question immediately comes up, "Why has the C. B. & Q. secured the results with zinc chloride treated ties as stated in this paper?" The answer is that the ties have been treated properly and thoroughly. To get proper results from treating ties with zinc chloride or any other process, the ties must be properly seasoned and then thoroughly and carefully treated.

The committee on miscellaneous subjects submitted a report on the practice of steaming ties in seasoning, outlining general principles to be followed, and recommend that this association co-operate with the United States Forest Service Laboratory in making tests to determine the effect of steaming on subsequent rate of seasoning in open air or kiln.

AIR PUMPS VS. HYDRAULIC PUMPS FOR INJECTING PRESERVATIVES INTO WOOD

By F. J. ANGIER

Superintendent of Timber Preservation, B. & O.

It is the practice at most timber-treating plants to use hydraulic pumps to force the preservatives into the wood. This is a practical and efficient way of performing that service, and while the hydraulic pumps may have some advantages over the use of compressed air, they also have some disadvantages. When designing the B. & O. plant at Green Spring, W. Va., this feature was given careful consideration, and it was finally decided to use the air pump. The idea of employing compressed air for forcing the preservative solution into the wood to be treated was, so far as is known to the writer, first adopted by the C. & N. W. at its plant at Escanaba, Mich. Here the apparatus is different from that used by the B. & O., but the principle is practically the same.

The advantages of the air pump are: Only one tank is required for each retort, that tank serving in the triple capacity of pressure tank, measuring tank, and drain tank; one air pump is ample for three retorts, while one hydraulic pump is required for each retort; the maintenance of one air pump is much less

than three hydraulic pumps, and is decidedly cleaner. The air pump requires less attention, and lessens the cost of packing, lubricants, valves, valve seats, plungers, etc.

An air pump is a necessity in plants using hydraulic pumps for blowing back solution, unless those plants are equipped with expensive underground receiving tanks. In the latter case an air pump can be dispensed with in lieu of a large oil pump for pumping solution back into the working tank. The underground receiving tank is more expensive in operation than the air pump, and no doubt this is the reason why so few plants are thus equipped. One air pump can be operated on two or more retorts at the same time without deranging the gage readings. This is not practicable with hydraulic pumps. Experience has taught us that it is practically impossible to maintain a steady and constant pressure on a charge of timber with a hydraulic pump, even though it is equipped with relief valves, while with the air pump this is easily accomplished.

The amount of steam required to operate one air pump is not more than would be required to operate three hydraulic pumps, but as the exhaust steam is used for heating purposes, this feature is not so important.

The initial cost of installing the air pump system is a trifle more than for the hydraulic pump system, but the maintenance is less, and in the long run air is more economical.

With hydraulic pumps there is more machinery to care for, more tanks to look after, and more piping and valves to maintain. There is also more work for the engineer, and unless everything is compactly arranged the engineer will require an assistant. With the air pump one man can easily look after the entire operation with greater satisfaction and with better results.

MECHANICAL HANDLING OF RAILROAD CROSS TIES AND TIMBERS AT TIMBER PRESERVATION PLANTS

By LAMBERT T. ERICSON

Asst. Supt., Port Reading Creosoting Plant

There are a number of items to be considered in devising the best and most efficient method for handling cross ties and heavy timbers at timber preservation plants. Although each plant and location presents special problems and difficulties peculiar to itself, there are a number of conditions which are more or less common to all. Besides the common conditions of limited areas for storage and the receipt of great quantities of material at one time, there is the common co-ordinate difficulty of obtaining the necessary labor to meet the fluctuating demands. The problem of keeping down the cost of handling enters here. Where manual labor is depended upon entirely, it is necessary to have men skilled in their work, in order to keep the cost down to the regular piece-work rate, and when unskilled men are used, the cost of the handling goes up very materially. That is more true on the railroads where 7 x 9 x 8½ cross ties are used, than on those where smaller and lighter ties are handled.

The use of locomotive cranes to switch and unload the materials has proven economical and successful under certain conditions. They are able to displace a locomotive in doing the shifting and are able to pile twice as much material in the same area, at less than half the cost of the manual method, and are also able to attain great speed. The number of men required is very small in comparison with the manual method, and consequently the force required for the work becomes very nearly constant, no matter how much the receipt of material fluctuates, as there is always need for the men on other work when the lull comes. There are other ways of handling timber mechanically than with a locomotive crane, but the purpose of this paper is to show what the Philadelphia & Reading and the Central Railroad of New Jersey are doing at their timber preservation plant at Port Reading, N. J., with locomotive cranes.

The creosoting plant is located on Staten Island sound, with deep-water connections, and most of the timber comes in by schooners and steamships direct from the south. The storage

yard is adjacent to the docks. Twenty-five special flat cars, kept for the individual use of the treating plant, are used for transferring the material from the vessel to the yard, and are sufficient to keep five vessels unloading continually, under ordinary conditions. Each car holds an average of 190 standard ties, which are loaded in slings of 30 or 60, according to the height of the piles and the size of the crane doing the stacking. In this connection it might be well to say that the plant uses two 35-ton, one 20-ton, and one 10-ton locomotive cranes, the two 30-ton cranes ordinarily doing the stacking of ties and switch timber.

The slings are picked up and landed on the piles, where they are leveled off by hand at a piece-work rate. Switch timber is handled in much the same manner. Large dimension timber and piling is handled and sorted out by the 10-ton crane, generally handling each piece individually. The cross ties are piled in rectangular piles, 51 ft. long, to an average height of 25 ft. and contain an average of 1,850 ties. The switch timber is either piled, with the lengths varied, and all running one way, to an average height of 21 ft., or is lifted off the cars onto the ground by the crane, sorted into lengths by hand, made into slings, and then picked up by the crane again and put on the piles. The 20-ton crane is kept busy unloading the treated material from the trams into cars for shipment. This crane picks up a tram load of the material, at a time, and deposits it in the car. Nothing but coal cars and gondolas are used, there being a large supply of both kinds to draw from in this district. This crane loads for shipment between 5,000 and 6,000 ties per day.

Each 30-ton crane can shift and stack from 3,500 to 4,000 ties per day, or 150,000 ft. B. M., of switch timber. Including the cost of shifting the cars from the docks to the yard, the cost of stacking the ties with this method amounts to an average of \$0.008 per tie; the cost of stacking switch timber of promiscuous lengths together, an average of \$0.35 per M. ft., B. M. The cost of loading treated ties from the trams for shipment, with the crane amounts to an average of \$0.0045 per tie. In all these calculations the cost of operating the crane, including operator, has been figured at \$1 per hour. This allows for interest on investment, depreciation, coal, oil, etc. By close attention to details it has been possible to cut the cost very materially since the work was first commenced, and it will be cut still further as the system becomes more thoroughly established.

Among other papers presented were: "Some Methods of Separating Water from Creosote Oil," by Thomas White, assistant manager, American Creosoting Works; "The Construction of Creosoted Wood Block Pavements," by R. S. Manley, president of the Creosoted Wood Block Paving Company; "A Comparison of Wood Paving in European Countries and the United States," by S. R. Church, Barrett Manufacturing Company; "Results Obtained by Piling Creosoted Wood Blocks Closely in Cages and the Saving Effected Thereby," by R. H. White, president, Southern Wood Preserving Company; "New Type of Paving Block Plant," by J. B. Card, manager, Chicago, Creosoting Company, and "Tram Cars and Other Construction," by J. H. Grow, of the Allis-Chalmers Company.

THE EFFECT OF VARYING THE PRELIMINARY AIR PRESSURE IN TREATING TIES UPON THE ABSORPTION AND PENETRATION OF CREOSOTE

By CLYDE H. TEESDALE

Forest Products Laboratory, Madison, Wis.

The Forest Products Laboratory has been engaged in making experiments for the past two years to obtain data regarding various conditions in treating plant work. In the investigation discussed the object was to determine the effect of varying the air pressure applied prior to impregnation with creosote upon the rate and amount of absorption during the filling and pressure period; the amount of recovery or "kick-back" during release of pressure, the amount of recovery due to drip and a final vacuum, and the diffusion of preservative through the wood; and also

upon the transmission of air pressure, vacuum and oil pressure in the wood.

The experiments consisted of a series of runs made on hard maple, red oak, hemlock and loblolly pine cross ties. Five hundred maple, hemlock and red oak ties were cut in northern Michigan and Wisconsin in the winter of 1911-12, and had therefore been seasoned at least 18 months. The loblolly pine ties were cut in Mississippi in the spring of 1913.

In making the test, the ties were weighed separate and run into the treating cylinder. Two ties in each run were connected independently to two sets of apparatus for obtaining internal pressures. The cylinder was then closed and either a 26-in. vacuum drawn and held for one hour or an air pressure applied for one hour (except in the case of those runs in which atmospheric air was used).

Hot oil (150 deg. to 160 deg. F.) was then admitted to the cylinder. In the runs using preliminary vacuum this was not broken before admitting oil. In the runs using atmospheric pressure the air was released as oil was admitted. In both cases the oil was run in by gravity directly from the measuring tank. In the runs using preliminary air pressure the oil was pumped in against this air pressure, some air being continually released in order to maintain the pressure constant.

Measuring tank readings were taken before and after filling the cylinder. Oil was allowed to overflow from the top of the cylinder to make certain that no air pocket existed. The oil in the cylinder was then heated to 180 deg. F. (about 10 to 15 minutes required). After filling the cylinder the valve in the pipe leading to the measuring tank was closed. All oil pumped into the ties was taken from the weight tank in order to obtain accurate readings.

The pressure pump was started and 175 lb. pressure maintained until the calculated amount of 12 lb. of oil per cu. ft. was in the ties. Weight tank readings were taken at 10 minute intervals.

The valve in the pipe leading from the top of the cylinder was then opened and the "kick-back" run into the weight tank and recorded. This "kick-back" came largely from the ties, but a small amount was due to compressibility of the oil, and expansion of the cylinder under a pressure of 175 lb. per sq. in. This amounted to a total of about 12 lb. of oil in each run, or about one-third of a pound per cubic foot of timber. No allowance was made for this in figuring "kick-back." After the "kick-back" ceased the oil was drained from the cylinder by gravity into the receiving tanks. The valve was allowed to remain open for three minutes after the oil had ceased to run freely. While some oil undoubtedly drained from the ties during this period, some was also draining from the sides of the cylinder. This 3-minute period was fixed to obtain comparable results.

When final vacuum was drawn all pipes were closed except that leading from the top of the cylinder through the condenser and hot well to the vacuum pump. The pump was then started and the vacuum held for one hour after reaching 26 in. The vacuum was then released and the amount recovered during the vacuum period was weighed in the weight tank. The oil condensed and recovered in the hot well was also weighed. Except in the runs on loblolly pine, no oil was recovered in the hot well. When no final vacuum was drawn the total drip was weighed the next morning. In each run the charge was allowed to remain in the cylinder and drain over night. In the morning the cylinder was opened and the charge removed and weighed, each tie being weighed separately.

The following are brief statements of the results indicated by the experiments on red oak, maple, hemlock, and loblolly pine ties:

The absorption of preservative during the filling and heating period (initial absorption) was least when no preliminary vacuum or air pressure was used, and greatest when high preliminary air pressures were used. The time required to fill the cylinder varied from about 23 minutes, when preliminary vacuum

was used, to about 40 minutes, when a preliminary air pressure of 75 lb. was used. Loblolly pine was an exception.

Preliminary air pressures did not materially increase the time of the oil pressure period necessary to secure the required absorption in maple, loblolly pine, or red oak. In hemlock high pressures materially increased the time of treatment.

Loblolly pine required the shortest pressure period to reach the desired absorption. Maple ranked next in order, then red oak. Hemlock required, comparatively, a very long pressure period.

The smallest "kick-backs" were obtained when a preliminary vacuum was used; the highest when high preliminary air pressures were applied.

Final vacuum as applied in these tests had no marked influence on the amount of drip recovered, except in the case of loblolly pine. It, however, hastens recovery and enables oil to be saved that would otherwise drip on the ground. In either case the amount finally left in the ties in the majority of cases was nearly the same. The use of final vacuum renders the timber cleaner to handle. Final vacuum resulted in a heavy recovery from seasoned loblolly pine when preliminary vacuum and preliminary atmospheric pressure were used.

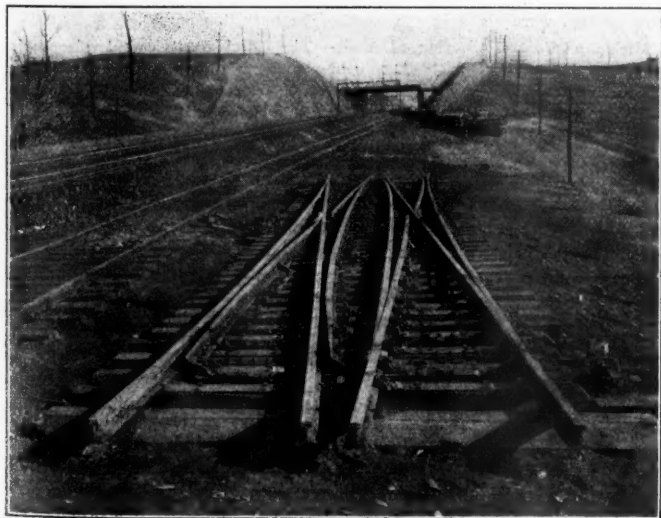
The distribution of preservative through the wood was apparently not influenced by preliminary vacuum or air pressure.

On Wednesday evening the annual banquet was held at Antoinette's restaurant. On Friday a trip was made by special train to Bogalusa, La., where a large saw mill of the Great Southern Lumber Company was visited. A stop was also made at the plant of the Southern Creosoting Company at Slidell, La. On Thursday afternoon a trip about the harbor was made on a steamer. The ladies were also the guests on sightseeing trips about the city during the convention.

At the Thursday morning session the following officers were elected: President, George E. Rex, superintendent of treating plants, Atchison, Topeka & Santa Fe, Topeka, Kans.; first vice-president, Carl G. Crawford, general manager American Creosoting Company, Louisville, Ky.; second vice-president, President Creosoted Wood Block Paving Company, New Orleans; third vice-president, F. B. Ridgeway, chemist International Creosoting Company, Texarkana, Tex.; secretary and treasurer, F. J. Angier, superintendent of timber preservation, Baltimore & Ohio, Baltimore.

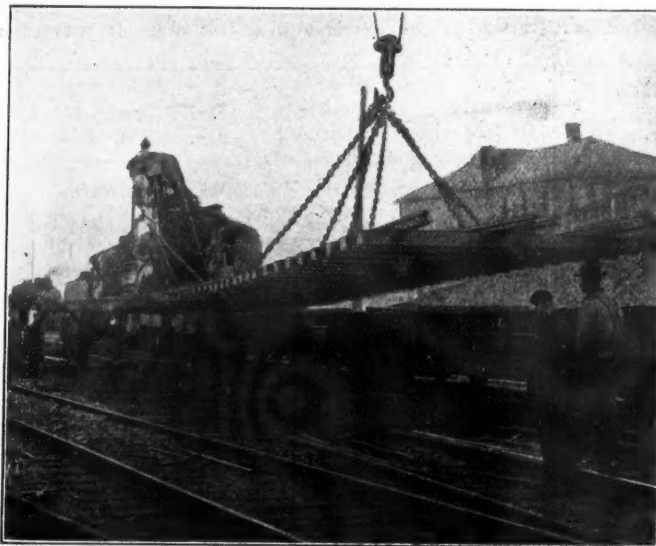
RENEWING A NO. 10 DOUBLE SLIP CROSSING IN 22 MINUTES

A No. 10 double slip crossing was recently renewed in No. 2 track at the western entrance to the Altoona yard in unusually short time by the use of two Bay City Industrial Works wreck-



New Slip Assembled Ready for Installation

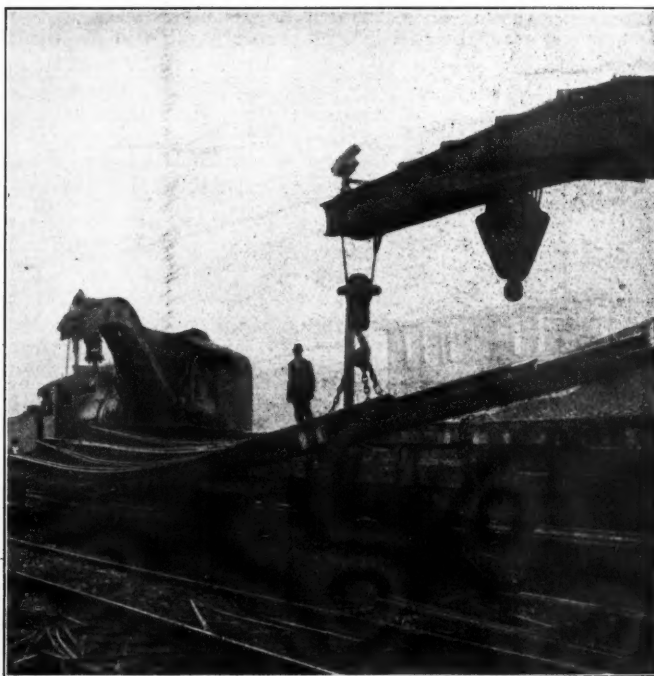
ing cranes. The new slip was of the latest standard design, no part of which was interchangeable with the parts of the old slip which was being removed. In addition, the old and new crossings were of different sections of rail. At a point where the traffic was as congested as here, it was impossible to renew the



Lowering New Slip Crossing Into Position

crossing in track under traffic and it was therefore necessary to place it in position bodily.

As this crossing was located in a deep cut it was also impossible to skid it into place from one side. It was therefore necessary to construct it alongside a drill track on a fill about 1,000 ft. west of the final location where there was no interference with traffic on the main tracks. This slip was constructed completely at this point, even to placing the interlocking connections



Lifting Old Crossing Out of the Track. New Slip on Cars

so that the minimum work would remain to be done when it was placed in the track.

The old crossing was prepared for removal by digging out all the ballast so that there would be a level place on which to place the new slip. The time selected for the change was Monday afternoon when freight movement was lightest and there

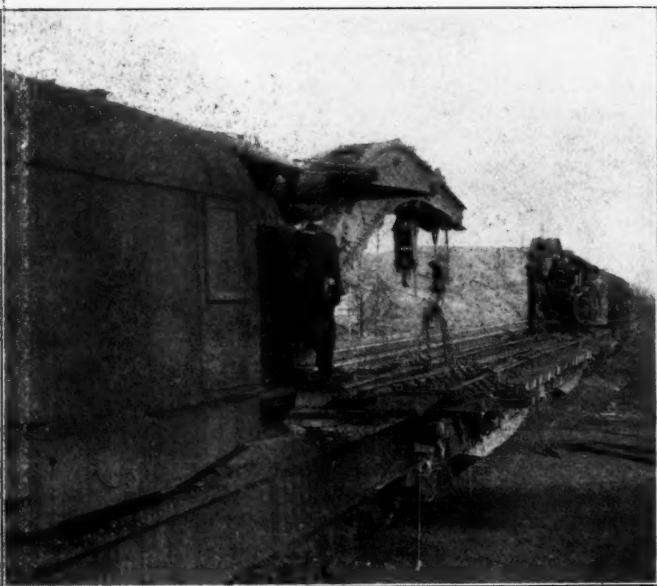
was a considerable interval between passenger trains. When all was ready, the wrecking force with two flat cars between the two steam derricks loaded the new crossing onto the flat cars and moved down into the yard near the location of the crossing.

Possession of the track was secured at 1:25 p. m.; the old slip crossing was cut loose at the end joints and two hitches were made preparatory to the derricks lifting it out. It was then



New Crossing Connected Up in Place

necessary to wait until the wrecking train could move from the yard track to the No. 1 main track alongside the slip crossing. This train arrived at 1:33 p. m., the derricks were immediately hooked onto the old crossing and it was raised and moved eastward a short distance onto No. 2 track on which it was laid temporarily. The train then backed up and the derricks lowered the new slip from the cars into its proper position in the track.



New Crossing Loaded on Cars

The train then loaded the old slip onto the cars and took it back to the fill to be torn apart as opportunity offered. The track was reported back into service at 1:47 p. m., thus making the actual time it was out of service 22 min., of which 7 min. were consumed in the movements of the wrecking train and in taking the accompanying photographs. The actual time consumed in disconnecting and removing the old crossing, placing the new one,

loading the old slip and getting the wrecking train clear of the main track was 15 min.

This is the fourth slip crossing which has been placed on this subdivision in this manner, two of those handled being No. 8s and the others No. 10s. In handling the new slip switches, eight hitches are taken to prevent sagging in the middle, although in handling the old one but four hitches are taken, as it is immaterial whether any of the parts are dislocated. With the No. 8 slip switches 64 ft. long, there is practically no sagging, but with the No. 10 slips 81 ft. long, there is some sagging, although not sufficient to cause any of the parts to become loose or dislocated. The first No. 8 crossing handled in this manner was built on two 60-ft. rails and the hitches were taken on these rails to eliminate the sagging, but it was found more difficult to get the rails and chains from beneath the crossing than to handle the crossing itself. While no crossings longer than No. 10 have been handled in this manner, the experience at this point has led to the conclusion that by using three flat cars and extension booms on the derricks to enable hitches to be secured close enough to the middle to prevent sagging No. 15 slip crossings could also be handled in this manner.

This work was handled under the supervision of J. O. Heap, supervisor, to whom we are indebted for this information and photographs.

ABSTRACT OF ENGINEERING ARTICLES SINCE DECEMBER 19, 1913

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since December 19, 1913:

High Cantilever Bridge in Mexico.—The National Railways of Mexico have recently completed a cantilever bridge with a total span of 390 ft. and a height of 230 ft. above the water on a new line west of Durango. This structure was described in an illustrated article in the issue of December 26, 1913, page 1223.

Preliminary Considerations in the Design of Opening Bridges.—The various features which an engineer must consider in designing bridges crossing navigable streams were discussed by Henry Grattan Tyrrell in the issue of December 26, page 1230.

New Railway Construction in 1913.—The mileage of new lines and of additional main tracks built in the United States in 1913 were given in detail in the issue of January 2, 1914, page 14. An editorial discussing these figures appeared in the same issue. Similar statistics regarding the number of cars and locomotives built and ordered and mileage of lines block signaled also appeared in the same issue in addition to other annual statistics of railway operation.

Chicago, Milwaukee & St. Paul Mountain Line Electrification.—The Chicago, Milwaukee & St. Paul recently announced that work would begin on the electrification of one entire engine district between Three Forks, Mont., and Deer Lodge. The details of this installation as far as they have been made public, were given in the issue of January 2, page 19.

Michigan Central Station, Detroit.—The Michigan Central placed in service on December 27, 1913, a new passenger station and general office building representing an expenditure of about \$7,000,000. This station and its facilities were described in an illustrated article in the issue of January 9, page 73.

Progress in the National Valuation.—The Board of Valuation Engineers of the Interstate Commerce Commission will begin the actual work of valuing the steam railroad properties within a short time. The work of this board to date was discussed editorially in the issue of January 16, page 111.

Heavy Improvement Work on the Erie.—The Erie is now completing some very heavy second track and grade revision work between Meadville, Pa., and Corry. This work was described in an illustrated article in the issue of January 16, page 125.

ABUSE OF EMPLOYEES ON CHINESE STREET RAILWAY.—The street railway company in Tientsin, China, has shops in which from 100 to 150 men are usually employed. For these workmen the company provides small Chinese-style houses, rent free. A free bath house is also maintained and daily baths for motormen and conductors are compulsory.

General News Department

At Washington, Pa., last Saturday, 26 train employees of the Pittsburgh & Lake Erie were suspended for violation of the rule forbidding the use of intoxicating liquors.

An interesting paper was presented at the January meeting of the Western Railway Club on Train Handling, by F. B. Farmer, of the Westinghouse Air Brake Company.

Passengers in a train of the Western & Atlantic were robbed near Vinings, Ga., on the night of January 16, and several hundred dollars taken. A sheriff on board the train fired at the robber but was himself slightly wounded, while the robber escaped.

The splendid new station of the New York Central at Rochester, N. Y., was opened for business on Monday last. Passengers pass to and from trains by subways, extending beneath the tracks. There are 11 tracks for passenger trains, each of a length equal to 14 coaches. In the passenger yard are about eight miles of tracks, or more than twice the length of tracks under the old arrangement.

The Safety First Society of New York City was organized at the Hotel Astor, January 19, with a long list of trustees selected from all departments of industry. A meeting of the trustees will be held soon for the election of officers and the appointment of an executive committee. Until organization is completed, Frederick H. Elliott will act as secretary, with office at the Hotel Astor.

Employees of the Boston Elevated road, to the number of 9,474, have secured an increase of pay as the result of a report of a board of arbitrators, the gross addition to the payrolls being about \$500,000 a year. Parts of the increases do not take effect until May 1, 1915. The arbitrators have prescribed many detailed changes in the regulations for overtime and in working hours generally.

Beginning February 1, the passenger trains of the Atlanta, Birmingham & Atlantic will run to and from the Terminal Station at Atlanta, instead of the Union Station as hitherto. The Terminal Station is used by the Atlanta & West Point, the Central of Georgia, and the Southern. The Union Station is used by the Louisville & Nashville, the Western & Atlantic, the Seaboard Air Line and the Georgia Railroad.

On a circuit of the Delaware, Lackawanna & Western, between Hoboken, N. J., and Franklin Furnace, the train despatchers are now using loud speaking telephones made by the Electrical Experiment Company of New York City. With this apparatus the despatcher is relieved of the necessity of wearing a telephone on his head. The receiving instrument is placed on the desk in front of him about six inches from his ear. The circuit is 108 miles long.

Secretary of Commerce Redfield announces that inspectors of the Bureau of Standards have found railroad track scales in the state of Vermont in an unsatisfactory condition. Altogether sixteen scales were tested. Allowing a tolerance of .2 of 1 per cent., which in the opinion of the bureau is a fair tolerance for such scales, 80 per cent. of the scales would have to be rejected; on a tolerance of .4 of 1 per cent., 60 per cent. would have to be rejected, and on a tolerance of 1 per cent. 40 per cent. would have to be rejected. Tests on the scales used by the customs service in determining the duty on certain imports at New York likewise disclose large errors. Of the sixteen scales tested there, 75 per cent. would have been rejected on a tolerance of .2 of 1 per cent.

Southern News Bulletin is the title of a monthly pamphlet which has been started by the Southern Railway, in the interest of the business of its own lines and those of the other companies associated with it. The first number, volume 1, number 1, for January, contains a portrait of the late president of the road, W. W. Finley, together with a sketch of his life. There is also a portrait of the new president, Fairfax Harrison. One of the

news items says that the manual block system, with telephone communication has been put in operation between Macon, Ga., and Jesup, 147 miles, and that in connection with this change 50 additional operators have been employed. Three additional train despatchers have also been employed on this part of the line, there having been a considerable increase in traffic.

The board of arbitration that has been considering the demands of the telegraph operators of the Wheeling & Lake Erie and the Wabash Pittsburgh Terminal, reported on January 13. The award includes the following points, and becomes effective as of December 1, 1913:

Minimum wage of \$65 a month.

Flat increase in wages of \$5 a month for all concerned.

Overtime wage rate increased from 25 cents to 30 cents an hour.

Vacation under full pay of 7 days after one year's service and 12 days after two years' service.

Reduction of work day from 11 to 10 hours in all one-man stations, and from 9 to 8 hours in all three-shift stations.

For unusual service in connection with train accidents and similar emergencies a minimum wage of \$3 a day with overtime based on the same rate.

The Workmen's Compensation Law, passed by the last Legislature of the State of New York, went into effect January 1, but the special commission, to be appointed by the governor to administer the law, has not yet been appointed, and the obligation on employers to pay compensation does not go into effect until July 1, next. The Insurance Department of the state, however, has prepared a digest of the new law, which has been issued in a pamphlet of 24 pages. The law applies only to so-called hazardous occupations, but these, as enumerated, in 42 groups, include not only transportation, but in general all employments in construction, manufacturing and the principal industries of the state, the employment specifically excluded being agriculture, domestic service, and occupations not conducted for pecuniary gain. For total permanent disability the compensation is two-thirds of the workmen's wages during the continuance of the disability; for the loss of a hand the compensation continues 244 weeks; loss of a leg 288 weeks; loss of an eye 128 weeks, etc.

Railway Strike in Portugal

A press despatch from Lisbon, January 14, reported the complete suspension of railroad traffic on all the lines of that country because of a strike. Later reports told of three derailments of passenger trains, injuring a number of persons, caused, no doubt, by strikers or their sympathizers. On the 21st 200 ring-leaders were arrested. It was declared then that the strike had been broken and that passenger trains were running on nearly normal schedules.

Federal Supervision of Sanitation

The House of Representatives, at Washington, on Tuesday of this week passed a bill to authorize the Public Health Service (which is a branch of the Treasury Department) to supervise sanitary conditions on railroad trains and in railroad stations. This branch of the Treasury Department already exercises some authority of this kind, orders having been issued last year to officers of the department requiring them, when traveling, to examine drinking water and toilet facilities.

Medal for Gustav Lindenthal

The International Exhibition at Leipzig, Germany, has made its highest award and given a gold medal to Gustav Lindenthal, chief engineer of the East River bridge division of the New York Connecting Railroad, for the design and plans of that bridge. The plans, strain sheets and all details were placed on exhibition, at the request of the exhibition authorities. The

New York Connecting Railroad, of which this bridge is the dominant feature, is being built jointly by the Pennsylvania and the New York, New Haven & Hartford, connecting the roads of the two companies by a line through Queensboro, New York City.

Safety First on the Grand Trunk

The "Safety-First" movement was begun on the Grand Trunk August 15 last, and the first general conference of the general safety committee was held at Montreal, January 12. On the 24 division, shop and terminal committees there are now about 600 members, and during the month of December these members corrected 500 unsafe physical conditions and cautioned employees against unsafe practices in 480 cases. George Bradshaw, safety engineer and secretary of the general committee, reported that the injuries to employees had been reduced 11.5 per cent. as compared with a similar period in the preceding year, while fatal injuries to employees have decreased 50 per cent.; and traffic was heavier in 1913 than in 1912.

Fast Time With a Silk Shipment

The largest single shipment of raw silk ever received at a California port arrived in San Francisco on January 6, on the Pacific Mail liner *Korea*, was at once turned over to the Southern Pacific company and was delivered to its New York owners four days later. Several records were broken with the shipment. The cargo consisted of 2,421 bales, weighing 220 lb. each, a total of over half a million pounds, with a value of \$2,500,000. The *Korea* crossed from Yokohama to San Francisco in 13 days. The Southern Pacific got the cargo to New York from San Francisco in 4 days, 14 hours and 40 minutes, breaking its own record by 1 hour and 1 minute. Altogether, only 18 days were consumed from the time the silk-laden *Korea* left Yokohama until the silk got into New York. The silk was loaded into 11 baggage cars at San Francisco in 45 minutes after the steamship was docked.

Railroad Map of New Mexico

The State Corporation Commission of New Mexico has just finished a railroad map of the state, in which the lines of each company are shown in a distinctive color. The total mileage of railroad in the state is 3,060, excluding 12 miles, recently finished and not shown on the map. The following are the lines shown:

STEAM RAILROADS—MAIN AND BRANCH LINES

	Miles line
Arizona and New Mexico.....	68
Atchison, Topeka & Santa Fe.....	1,194
Atchison, Topeka & Santa Fe coast lines.....	243
Chicago, Rock Island & Pacific.....	153
Cimarron & Northwestern.....	32
Colorado & Southern.....	82
Denver & Rio Grande.....	217
El Paso & Southwestern.....	635
New Mexico Central.....	116
New Mexico Midland.....	10
Santa Fe, Raton & Eastern.....	15
Southern Pacific.....	168
St. Louis, Rocky Mountain & Pacific.....	96
Zuni Mountain.....	25
Rio Grande & Pagosa Springs.....	6
Total.....	3,060

President Wilson's Attitude on Railroad Regulation

On Tuesday last President Wilson addressed Congress on the subject of the trusts and the proposals to amend the anti-trust law; and in one passage of his speech he is supposed to have expressed views favorable to the railroads, in connection with the application of the eastern lines, now pending before the Interstate Commerce Commission, for authority to increase freight rates. On this point the Washington correspondent of the New York Evening Post says:

"One thing in the president's message stands out with particular definiteness in the Washington mind, the words which are interpreted as indicating that the president favors the application of the eastern railroads for a 5 per cent. increase in freight rates. The president's state of mind about the justification of an increase in rates was obscurely foreshadowed in these dispatches last Friday. This is the paragraph that is interpreted

to mean that the president believes the application should be granted:

"Business men as well as those who direct public affairs now recognize, and recognize with painful clearness, the great harm and injustice which has been done to many, if not all, of the great railroad systems of the country by the way in which they have been financed, and their own distinctive interests subordinated to the interests of the men who financed them and of other business enterprises which those men wished to promote. The country is ready, therefore, to accept, and accept with relief as well as approval, a law which will confer upon the Interstate Commerce Commission the power to superintend and regulate the financial operations by which the railroads are henceforth to be supplied with the money they need for their proper development to meet the rapidly growing requirements of the country for increased and improved facilities of transportation. We cannot postpone action in this matter without leaving the railroads exposed to many serious handicaps and hazards, and the prosperity of the railroads and the prosperity of the country are inseparably connected. Upon this question those who are chiefly responsible for the actual management and operation of the railroads have spoken very plainly and very earnestly, with a purpose we ought to be quick to accept. It will be one step, and a very important one, toward the necessary separation of the business of production from the business of transportation."

"The particular phrases upon which the interpretation hangs are these: 'And the prosperity of the railroads and the prosperity of the country are inseparably connected. . . . Those responsible have spoken with a purpose we ought to be quick to accept.'

"It would not be possible to arrive at the generally accepted interpretation merely on the face of the message and without private information, the source and nature of which may not be disclosed. But a key has been given to your correspondent and others to enable them to read between the lines and to venture to record without much hesitation that Mr. Wilson does favor allowing the increased rates. When the president was asked bluntly about the truth of a report that he had said that he favored the application of the carriers, he replied that any one could always feel sure that he was misrepresented if quoted as expressing a definite opinion on any question while it was pending judicial determination.

"It is believed, though, that the president's willingness to see the increase in rates granted hinges absolutely upon the acceptance by Congress and by the carriers of his recommendation that power be conferred upon the commission to 'superintend and regulate the financial operations.' . . . In other words, to control the issuance of stocks, bonds, etc. It is believed, too, that the enactment by Congress of this legislation would materially affect the minds of the members of the Interstate Commerce Commission. . . ."

New B. & O. Freight House at Twenty-sixth Street, New York

The Baltimore & Ohio has just put in operation at its yard at Twenty-sixth street and North river, New York City, a new freight warehouse, 350 ft. long by 68 ft. wide and eight stories high. This station also has a paved yard with team tracks to accommodate 75 cars. The building is of concrete, thoroughly fireproof and is equipped with a sprinkler system connected with water tanks of 75,000 gals. capacity. The tracks within the building have a capacity of 18 cars. At each floor there are automatic scales, with dial indicators; and the building has six electric elevators with a capacity of 10,000 lb. each. The elevators travel at the rate of 100 ft. a minute and serve not only the eight floors but also the basement. One track is arranged for the unloading of automobiles from the end doors of freight cars and there is one elevator with a floor 12 ft. by 17 ft. to carry automobiles and other large packages. The strength of the floors of the building varies from 500 lb. per sq. ft. on the first floor to 150 lb. on the top floor. Above the first floor the building is divided into three sections by fire walls.

The structure is of the "flat slab" type, the first of this type approved by the building department of Manhattan. In this type the reinforcing rods radiate in all directions from the columns into the floor slabs, the loads being transmitted from the floor direct to the columns. Thus floor beams, which cut down the head-room, obstruct light and interfere with the sprinkler system, are avoided. The curtain walls were carried

up monolithic with the floors and the columns, instead of being filled in after the column and floor skeleton was in place. Bids were taken on three types of concrete construction, as follows: Beam and girder with exterior curtain walls of concrete; beam and girder with exterior curtain walls of brick; flat slab type with exterior curtain walls of concrete. The lowest bid was on the flat slab type; the next lowest was on the beam and girder with concrete curtain walls, and the highest were on the beam girder type with brick curtain walls.

Before work was started on the building, test holes were sunk and it was found that the rock sloped very rapidly toward the river; the depth to rock below the street at Eleventh avenue being approximately 55 ft. and at the opposite end of the building approximately 90 ft. Over 3,590 wood piles were driven, ranging from 45 ft. to 85 ft., the total length of piling driven exceeding 41 miles. These were driven with great difficulty at certain points, as old piles were encountered and the remains of old piers. A number of old boats were also encountered. These obstructions caused delay and added expense. In the construction of the building 15,000 cu. yds. of concrete and 675 tons of reinforcing steel were used.

The sub-structure was built by the Phoenix Construction Company, and the superstructure by the Turner Construction Company. The warehouse was designed by M. A. Long, assistant to the chief engineer of the road.

Annual Report Panama Railroad

[From the Canal Record.]

The net income of the Panama railroad and steamship line during the fiscal year ending June 30, 1913, after meeting the total cost of operation, together with fixed charges aggregating \$113,585.39, and charges for depreciation of rolling stock, floating, and plant equipment, amounting to \$268,942.62, was \$2,179,175.50, an increase of \$417,126.28 over the net income during the preceding fiscal year.

At the close of the fiscal year, the company's funds in bank amounted to \$2,520,216.13, and, in addition, there was held in the reserve fund established September 12, 1911, savings bank securities purchased at a cost of \$1,590,234.75, an increase of \$96,771.25, due to a reinvestment of accumulated interest. The sum of \$244,694.92, representing the total of losses incurred by the company from March 4, 1910, to June 30, 1913, of a character ordinarily recoverable under fire and marine insurance, but by Congressional enactment not so underwritten since the first mentioned date, has been carried to the debit of the company's "profit and loss" account. The status of the company's indebtedness to the United States government remains unchanged. This indebtedness amounts to \$3,247,332.11.

The gross operating revenues of the company for the fiscal year ending June 30, 1913, amounted to \$6,750,321.12, an increase over 1912 of \$211,428.40. The gross operating expenses for the same period were \$4,699,978.52, a decrease of \$154,307.94, as compared with the preceding year, making the total gain in operating revenue over operating expenses \$365,736.34.

The operating revenue of the railroad from all sources shows an increase of \$57,674.23. The gains were, as follows: Seven per cent. on local commercial freight; .35 per cent. on local I. C. freight; 22.23 per cent. on through passenger traffic; 11.40 per cent. on local passenger traffic, and 15.44 per cent. on other transportation revenue. The decreases were confined to a loss of 3.63 per cent. on through commercial freight, and 5.69 per cent. on nontransportation revenue. The net increase is equivalent to 1.27 per cent.

Passenger Traffic.—The number of first-class passengers carried by the railroad during the fiscal year was 877,589, as compared with 777,121 during the preceding year, a gain of 12.93 per cent. The number of second-class passengers carried was 2,039,068, as compared with 1,980,550 during 1911-12, a gain of 2.95 per cent. The gross revenue from the transportation of passengers was \$826,398.54, an increase of \$88,651.18, or 12.02 per cent. The revenue received from through passengers showed an increase of \$9,148.17, or 22.23 per cent.; the number of these passengers increased 8,317, or 55.16 per cent., as compared with the previous twelvemonth. Local passengers showed a gain in revenue of \$79,503.01, or 11.41 per cent., and an increase in the number carried of 150,669, or 5.50 per cent.

Freight Traffic.—The total revenue freight traffic of the rail-

road during the past fiscal year, including both merchandise and coal, was 1,949,215 tons, an increase of 132,296 tons, or 7.28 per cent. The total revenue derived from this traffic was \$2,785,512.70, a decrease of \$35,438.44, or 1.26 per cent. In addition to the above traffic, 77,637 tons of company freight, 2,188 tons of mails and baggage, and 3,221 tons of express were hauled. Of the total freight tonnage hauled, 67.06 per cent. was southbound, and 32.94 per cent. northbound, as compared with percentages of 73.55 and 26.45, respectively, for the year before. The through freight traffic was 29.31 per cent. of the total tonnage carried, as against 36.80 per cent. for the previous year. Coal, including that of the company, comprised 42.15 per cent. of the local traffic southbound.

Summary.—The following table summarizes railroad operations on the isthmus during the fiscal year ending June 30, 1913:

	1913	1912
Average miles operated	61.98	50.79
Gross operating revenue	\$4,599,163.13	\$4,541,488.90
Operating expenses	\$2,770,310.45	\$2,655,121.51
Net operating revenue	\$1,828,852.68	\$1,886,367.39
Per cent. expense to revenue	60.24	58.46
Gross revenue per mile	\$74,203.99	\$89,416.99
Operating expense per mile	\$44,696.84	\$52,276.46
Net revenue per mile	\$29,507.15	\$37,140.53
Revenue per passenger train mile	\$6.24	\$6.26
Revenue per freight train mile	\$11.94	\$11.47
Amount operating pay rolls	\$1,709,211.80	\$1,701,106.32
Tons per loaded car	23.63	22.26
Tons per train	353.21	295.23
Freight, passenger and switch engine mileage	892,380	803,181
Work train engine mileage	200,295	190,230
Passenger train mileage	184,964	163,083
Freight train mileage	235,228	248,741

The total trackage on June 30, 1913, under control of the railroad, amounted to 143.19 miles.

The operating revenue of the steamship line for the fiscal year was \$2,151,157.99, or \$153,754.17 in excess of the previous year. The deficit of \$201,761.13 in 1912 was replaced in 1913 by a net profit of \$221,489.92, thereby producing a combined increase in net revenue for the line of \$423,251.05. There was a decrease of 27,666 tons in amount of freight transported, but of only \$18,982.66 in revenue. The disproportionate decrease in tonnage and revenue is accounted for by a material reduction in unremunerative coastwise traffic, and a corresponding increase in the transportation of foreign freight at higher average through rates. The number of passengers carried increased 3,068, which resulted in a corresponding increase from that source of \$124,148.86. Mail earnings increased \$46,791.21 during the year.

Railway Strike in South Africa

A general strike of railway employees on all the railroad lines in the different states of the Union of South Africa, which was begun January 8, caused serious interruptions of traffic for a week or more; but the government appears to have finally controlled the situation. The leaders of the striking employees were arrested on charges of sedition, and their followers then subsided. Dynamite was used in one case in an effort to blow up a passenger train. In the Transvaal the entire militia defence force was called out by proclamation, and in all the states the strikers appear to have been vanquished by the firm stand of the authorities. One report said that 200,000 men were under arms. All of the railroads are owned and operated by the states.

The strike appears to have been part of a general movement, on the part of white workmen of all classes, industrial conditions in South Africa having been unsettled for some time. The economic condition of the working classes has been a subject of anxiety for many months, and the railroad strike was finally precipitated by certain orders requiring retrenchment.

It was estimated on January 18 that the strike had cost about \$2,000,000, the mobilization of the militia having been very extensive.

Serious Congestion at North Station, Boston

Tower A, containing the large electro-pneumatic interlocking machine at the North Station, Boston (Boston & Maine), was destroyed by fire on Wednesday morning, January 14, about 9 o'clock, and literally hundreds of trains were badly delayed. Most of the inbound passenger trains had to discharge their passengers at stations several miles outside of Boston and the passengers were obliged to get to the city by street cars. The fire is said to have been due to careless use

of a plumber's torch. For more than two hours all passenger traffic was completely paralyzed and every line entering the station was badly crippled for the rest of the day. Tower A stands on the bridge over Charles River, just outside the station, and controlled the switching of all trains that enter and leave the station.

About 2,900 switching operations were performed in this tower daily, including regular trains, light locomotives, empty trains and other shifting operations. The machine was one of 60 levers.

The fire caught in the center of the basement room from a torch that was being used to thaw out a drain pipe. The flames spread rapidly, shooting up through the building and rendering it very difficult for the men upstairs to escape. The previous day was one of the coldest in the history of Boston and the thermometer registered 5 deg. below zero at the time the fire broke out.

From an operating standpoint the conditions at this yard are as difficult as any in the United States. Something like 575 passenger trains pass in and out of the station daily. There are 25 tracks in the station, which converge into 8 tracks leading over drawbridge No. 1, which is immediately in front of Tower A. Several inbound trains were already on or near the bridge before orders could be given to empty them at outside stations, and at once a passenger train service was inaugurated to transport the passengers past the scene of the fire. Notwithstanding this service, however, large numbers of people kept crowding onto the bridge, and, to insure safety for all, a train of empty passenger coaches was strung over the draw to a point far beyond the danger zone. These cars were used by the passengers as a passage way to their destination in the station.

All Fitchburg division trains were diverted at another tower, farther out, and sent through the freight yards to the old stone headhouse formerly used by the Fitchburg. The tracks in front of this station were immediately cleared to make platform room for passengers, while a large force of pilots and switchmen were on hand to safeguard operations. The trains from the other divisions were then taken care of by one makeshift or another.

The tower force—the directors, lever men and helpers—were at once put in charge of the handling of the ground switches and of the operation of the trains in and out of the station. Large forces of reliable switchmen and signal men were brought to their assistance, and they succeeded quite well in working the switches from the ground. The yardmaster had in his forces only half a dozen men sufficiently familiar with the tracks to be entrusted with the handling of switches on the ground, but men from outside were soon gathered. Some of the short trip passenger trains were discontinued, in order to keep traffic moving, and even on the next day, Thursday, it was said that of the 600 trains normally using the station each week day nearly 200 had been discontinued. The arrangement of trains running into the main station was changed somewhat so that fewer movements would have to be made through crossovers.

The signal department was soon able to connect a large number of switches with the corresponding signals, and in a short time they had perfect control of a number of tracks in and out of the station. These arrangements were made while the fire was in progress. The rest of the despatching had to be performed by means of hand signals.

The bridge and building department was at once called upon to put up a dozen or more small shanties for the switch tenders at suitable points between the tower and the station. In these cabins telephones were immediately installed, and in less than six hours after the cabins were ordered the arrangements were all completed and trains were again entering and departing from the station.

On the first day towards the evening fully 50 per cent. of the trains both ways were restored; on the second day 70 per cent., and on the third day 80 per cent. On the third day 86 per cent. of the trains were on time.

Particularly good work was done at the old Fitchburg station. The tracks north and west of the station were quickly cleared and electric lights, telephones, etc., were installed, so that by 5 p. m. on the day of the fire the immediate vicinity of the old station was flooded with light and a temporary terminal made where passengers' wants were attended to with safety and a good degree of convenience.

Owing to the promptness of General Manager Pollock and General Superintendent Tyter in organizing relief work there was very little friction observable in the arrangements anywhere. Evidently no expense was spared in affording prompt and safe movement of trains. The extra force gathered numbered upwards of a hundred men. These were assigned to man the switches, to guard the dangerous places, pilot the trains, and inspect all possible sources of danger. A complete organization was formed to enable the train directors and switchmen to work on eight hour shifts, but the officers and many of the subordinates worked night and day to meet the strenuous conditions imposed upon them.

In the station proper, through which an average of 90,000 passengers pass daily, steps were taken to issue notices giving hourly information in regard to the situation; this in order as far as possible to avoid delay and annoyance. Furthermore, notices were also posted recommending that in certain cases suburban passengers should have recourse to the electric street cars. The newspapers were kept fully informed in regard to the arrangement and rearrangement of the service.

It is impossible within a limited space to describe the operating difficulties that resulted from this fire, and it must suffice, therefore, to say that a really wonderful success was achieved. If the observer had a hundred eyes and could be in a dozen places at once a great "human story" could be written; a story of hardships, grit, patience, loyalty and vigilance. These qualities were brought into play and exercised both efficiently and cheerfully.

Railway Club of Pittsburgh

The Railway Club of Pittsburgh will hold its regular meeting on Friday, January 23. The paper of the evening is entitled "Thermit, and Its Latest Development in Railway Shop Practice." It will be given by W. R. Hulbert, assisted by H. D. Kelly, of the Goldschmidt Thermit Company, and will be illustrated by moving picture views, lantern slides and an actual demonstration of pipe welds, burning holes in steel plates, etc.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 5-8, Hotel Pontchartrain, Detroit, Mich.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass. Convention, May 19, 1914, St. Louis.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill. Next convention, April 21, Houston, Tex.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 29 W. 39th St., New York. Mid-year conference, New York, January 29, 30, 31.
- AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 17-20, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Karpen building, Chicago. June 15-17, Atlantic City, N. J.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga. Next convention, July 20-22, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 West 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wenlinger, 11 Broadway, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, Highland Park, Ill. Annual meeting, June 24, Minneapolis, Minn.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, 1914, St. Paul, Minn.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 20-23, New Orleans, La.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York.
- ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Detroit, Mich. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and August, Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursday, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after second Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. H. Hiles, Oliver building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 20-22, Galveston, Tex.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago. Annual convention, May 18-22, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 14-17, Hotel Sherman, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Next annual meeting, May 26-29, Hotel Waldron, Philadelphia.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Karpen building, Chicago. June 10-12, Atlantic City, N. J.

MASTER CAR & LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass.

NATIONAL RAILWAY APPLIANCE ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3rd Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria; 2d Thursday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, August, Chicago.

UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Roseyear, P. O. Box 1707; Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Karpen building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News

E. B. Boyd, who resigned on January 1, as assistant to the vice-president of the Missouri Pacific, has been appointed manager of the transportation department of the Chicago Board of Trade, succeeding W. M. Hopkins.

The Pennsylvania Railroad is to open a new station for out-bound freight in New York City, at Pier 22, East River. The Pennsylvania's freight station facilities in New York hitherto have been confined entirely to the North River side of Manhattan Island.

The Western Classification Committee will hold a hearing at Chicago on January 27 for the purpose of considering applications for changes in ratings, rules, etc., in the classification of tobacco at the morning session and cement tile drain heads at the afternoon session.

Shipments of anthracite coal in the month of December amounted to 5,662,618 tons, or somewhat less than in November and less also than the total in December, 1912. Shipments for the year 1913 aggregated 69,069,628 tons, or about 6,000,000 tons more than in 1912.

The National Baggage Committee, a committee of which the commercial organizations of New York and other prominent cities are the sponsors, has filed with the Interstate Commerce Commission a petition, asking that the railroads be required to reduce their rates for extra baggage.

The Long Island Railroad reports that the number of 60-trip monthly commutation tickets sold by that road in 1913 was 215,419, or more than 56 per cent. greater than the number sold in 1910, which was before the extension of the road into Manhattan through the East River tunnels.

The order of the Interstate Commerce Commission, reducing season ticket fares on the New York, New Haven & Hartford, between New York City and points in Connecticut, went into effect January 15; and now passengers buying tickets at Port Chester, the easternmost station in New York, pay \$9.90 a month, while those in Greenwich, Conn., about three miles beyond, pay only \$8.65.

National Business League Favors Rate Advance

The directors of the National Business League of America, at a meeting in Chicago on January 15, adopted the following resolutions:

"Whereas, We believe that the present net earnings of the railways are insufficient for the proper maintenance of equipment, extension of facilities, efficient service and safety of life and property resulting also in the curtailment of purchases from dependent industries which seriously cripples the general business of the country, therefore be it

"Resolved by the board of directors of the National Business League of America that as a necessary measure, imperative to the prosperity of carrier, shipper and business interests generally, an immediate uniform increase of not less than 5 per cent. in transportation rates be granted the railway interests."

Questions Involved in Railway Valuation

Hon. Charles A. Prouty, of the Interstate Commerce Commission, in an address before the Dartmouth Alumni Association of Chicago, on January 17, briefly discussed some of the problems involved in the valuation of railways. He said there is no great difficulty involved in obtaining an approximately accurate inventory of the railway property of the country, and that in 10 years the commission will have at Washington a complete record of the units included in the property of every railroad in the United States, so that the investor in railroad stock or bonds can ascertain the value back of his investment. However, said Mr. Prouty, the great problems involved in the work go beyond a mere inventorying of the property, and he cited three examples as illustrating these problems.

One of the first roads selected by the commission for valu-

ation is the San Pedro, Los Angeles & Salt Lake. This road was built in recent times and the amount invested in it is known. It was constructed and located according to the best judgment of the engineers, but many miles of it were washed away by a flood. The line was rebuilt at great expense, on a location considered safe, and two years later much of the track was again washed away; and the line has been again restored. This instance presents, in a very marked degree, he said, the question as to how much shall be allowed the owners of the property for what might be termed the cost of experience.

The second example was that of the Northern Pacific, which, in a case before the commission, presented a valuation of its property, including land used in the Spokane terminals, valued today at approximately \$5,000,000, but which, he said, never cost the road a dollar. To whom does that \$5,000,000 belong? The Northern Pacific or the people? Shall the Northern Pacific be allowed to tax the people by rates sufficient to pay a return on that \$5,000,000, and on the additional millions of the same kind of value included elsewhere in the property of the road?

He also cited the case of the Pennsylvania Railroad, which in the past 10 years has put into its property in improvements, approximately \$200,000,000 of earnings, in addition to paying the stockholders a fair return. To whom does that \$200,000,000 belong? The stockholders of the Pennsylvania Railroad or to the people? That, he said, is a question of tremendous importance.

The great problem, according to Commissioner Prouty, is not an engineering one. It is first an economic problem, next a legal problem, and finally a political problem. Courts and commissions may for a time determine questions of this kind, but will not the sense of the people finally control? He declared that the great importance of the valuation lies in the fact that the people may thereby be enabled to know what the railroads are worth, and therefore may be better able to determine how they shall be treated.

Car Location

The accompanying table, which was taken from bulletin No. 13-A, of the American Railway Association, gives a summary of freight car location by groups on December 15, 1913.

CAR LOCATION ON DECEMBER 15, 1913.

	New England.	N.Y., N.J., Del., Md., Eastern Pa.	Ohio, Mich., Western Pa.	Ind., W. Va., No. & So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wisc., Minn.	Mont., Wyo., Neb., Dakotas.	Kans., Colo., Okla., Mo., Ark.	Texas, La., New Mexico.	Oregon, Idaho, Nev., Cal., Ariz.	Canadian Lines.	Grand Total.
Total Cars Owned.....	78,279	694,224	270,371	196,771	175,989	490,640	19,248	156,905	32,109	137,569	147,499	2,399,604
Home Cars on Home Roads.....	37,747	387,927	90,518	104,217	87,029	332,435	7,043	82,959	14,673	76,132	97,835	1,318,515
Home Cars on Foreign Roads.....	40,532	306,297	179,853	92,554	88,960	158,205	12,205	73,946	17,436	61,437	49,664	1,081,089
Foreign Cars on Home Roads.....	48,215	282,653	200,551	86,934	79,912	160,011	11,647	72,607	35,533	57,686	37,072	1,072,821
Total Cars on Line.....	85,962	670,580	291,069	191,151	166,941	492,446	18,690	155,566	50,206	133,818	134,907	2,391,336
Excess or Deficiency.....	7,683	*23,644	20,698	*5,620	*9,048	1,806	*558	*1,339	18,097	*3,751	*12,592	*8,268
Surplus.....	1,205	20,079	12,148	6,980	5,790	15,577	920	5,461	3,162	20,822	15,369	107,513
Shortage.....	51	157	263	2,467	387	1,072	369	365	38	202	597	5,968
Shop Cars—												
Home Cars in Home Shops.....	4,547	39,978	19,490	13,331	11,782	25,701	580	10,131	2,285	4,429	5,801	138,055
Foreign Cars in Home Shops.....	967	10,570	7,801	1,820	1,930	4,795	465	2,306	1,301	2,179	328	34,462
Total Cars in Shop.....	5,514	50,548	27,291	15,151	13,712	30,496	1,045	12,437	3,586	6,608	6,129	172,517
Per Cent. to Total Cars Owned—												
Home Cars on Home Roads.....	48.35	55.88	33.48	52.96	49.45	67.76	36.59	52.87	45.70	55.34	66.33	54.95
Total Cars on Line.....	107.18	96.59	107.58	97.14	94.86	100.37	97.10	97.45	156.36	97.27	91.46	99.65
Home Cars in Home Shops.....	5.81	5.76	7.21	6.77	6.69	5.27	3.01	6.46	7.12	3.22	3.93	5.75
Foreign Cars in Home Shops.....	1.04	1.52	2.89	.92	1.10	.98	2.42	1.36	4.05	1.58	.23	1.44
Total Cars in Shops.....	6.85	7.28	10.09	7.70	7.79	6.25	5.43	7.82	11.17	4.80	4.16	7.19

*Denotes deficiency.

Free Transportation

The Interstate Commerce Commission has made a ruling to the following effect: A number of carriers participate in paying the salary of the proprietor of several union ticket officers located in hotels and other prominent places in the large cities. The proprietor's name appears on the payrolls of some of the carriers, but he himself engages his own employees and pays their salaries. It is held that such employees are not *bona fide* employees of the carriers, and are not, therefore, entitled to free interstate transportation.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Commissioner Prouty held a hearing in Chicago on January 17 in a case instituted by the Omaha Grain Exchange to obtain a readjustment of rates on grain from Montana points to Omaha.

The commission has suspended from February 9 to May 1 a Canada Atlantic Transit Company tariff containing proposed increased class rates from New York, Boston and certain other points, to St. Paul, Minn., and points taking the same rates.

The commission has further suspended from January 30 to July 30 certain schedules in tariffs of F. A. Leland, agent, containing increased rates on cotton seed hulls, in carloads, from Beaumont, East Beaumont and Houston, Texas, to New Orleans and certain other points in Louisiana.

The commission has further suspended from January 29 to July 29 certain schedules in tariffs of the Atlantic Coast Line and other carriers containing increased class and commodity rates from Norfolk, Richmond, Lynchburg and Roanoke, Va., and other points taking Virginia cities rates to Vicksburg, Miss., Montgomery, Ala., Atlanta, Ga., and other southern points.

The commission has further suspended from January 28 to July 28 certain schedules in tariffs of C. C. McCain, Eugene Morris and R. H. Countiss, agents, etc., by which it was proposed to cancel the concentration and storage privileges on shipments of butter, eggs, cheese and dressed poultry, moving from points in Nebraska, Kansas and other states to the Pacific Coast.

The commission has further suspended from January 26 to July 26 schedules in a Missouri Pacific and a St. Louis, Iron Mountain & Southern tariff providing for the cancellation of

rates on uncompressed cotton and cotton linters from Arkansas points to Little Rock, Norrilton and Conway, Ark., to be concentrated, compressed and reshipped to interstate points.

A large number of associations and shippers have filed protests against any increase in rates applying upon specific commodities, and have asked to be heard in support of their objections. The commission has decided that the protestants are legally entitled to be heard before a final decision is rendered on the pending application of the railroads for per-

mission to make a general increase in freight rates. It has concluded to commence hearings on the specific objections of the protestants at once, as it is necessarily deferring its hearings on the broader questions involved until the railroads have answered the inquiries filed of record under date of December 20, and desires, so far as possible, to expedite proceedings. The dates for the various hearings have been assigned as follows: January 26, petroleum; January 27, ice; January 28, tile, brick and clay; January 29, boots and shoes; January 30, flour; January 31, peanuts; February 2, bituminous coal; February 5, linseed oil, corn oil, etc.; February 8, glucose, starch and other corn by-products; February 7, wooden barrels, pails, tubs, etc.; February 9, sand and gravel; February 10, cement; February 11, iron and steel articles, cast iron pipe and raw materials entering into the manufacture process of same; February 12 and 14, lake and rail rates; February 16, glass; February 17, coffee; February 18, pulp and paper; February 19, plaster; February 20-21, lumber and forest products; February 24, packing house products; February 25, limestone; February 26, salt; February 27, fruit; February 28, stone, marble, granite; March 2, hides and leather; March 3, sugar, molasses and syrup; March 4, truck farm products and fish; March 5, hay and grain.

The commission has further suspended from January 28 to July 28 certain schedules in tariffs of C. C. McCain, Eugene Morris and R. H. Countiss, agents, by which it was proposed to increase rates on gasoline engines and parts shipped in mixed carloads with wind mills and wind mill parts, from Chicago and other eastern points to San Francisco and other Pacific coast points.

Rate on Petroleum from Marshalltown, Ia., to Kansas City Unreasonable

Marshall Oil Company of Iowa v. Chicago Great Western et al. Opinion by the commission:

Complainant, a corporation with principal office and factory at Marshalltown, Ia., alleges that the rate of 22 cents per 100 lb. on petroleum and its products from Marshalltown to Kansas City, Mo., is unreasonable in that it exceeds 17 cents, the rate from Kansas City to Marshalltown, and seeks reparation upon past shipments and the establishment of a reasonable rate for the future. The commission finds that the rate should be 17 cents in either direction. Reparation for past charges collected in excess of that rate will be awarded when a statement of the various shipments moved has been filed with and verified by the commission. (28 I. C. C., 708.)

Rate on Glucose from Chicago to St. Joseph, Mo.. Reduced

National Syrup Company v. Chicago & North Western et al. Opinion by Commissioner Harlan:

The complainant, with factory at St. Joseph, Mo., obtained its raw glucose from Clinton, paying a rate for its transportation to St. Joseph of 18½ cents. By a custom of the trade the price of the glucose is set by the price at Chicago, plus the rate from Chicago to St. Joseph. The complainant does not use the rate from Chicago to St. Joseph, which is 23½ cents per 100 lb., but it enters arbitrarily into the price which it pays for its raw material. The complaint is made that the rate is excessive. The commission finds that the rate of 23½ cents is unreasonable, and that the rate for the future ought not to exceed 18½ cents per 100 lb. The commission does not necessarily believe that this readjustment will be of any aid to the complainant. The change is made because the rates on glucose and on syrup should not be the same. The glucose is often shipped in tank cars, whereas the corn syrup must be shipped in box cars. The intrinsic value of the corn syrup may be but 15 per cent. greater than that of glucose, but its market value is much greater. (28 I. C. C., 673.)

Reparation Awarded on Shipment of Ties

Mercantile Lumber & Supply Company v. St. Louis Southwestern et al. Opinion by the commission:

Complainant shipped from Catron, Mo., to Chicago three carloads of hewn oak ties, which were routed over the St. Louis Southwestern from Catron to Parma, over the St. Louis & San Francisco from Parma to Thebes, and over the Chicago & Eastern Illinois from Thebes to Chicago. Prior to the time that shipment was made there was in effect a published rate on lum-

ber, including oak and hewn oak ties, from Catron to Thebes via the St. Louis Southwestern of 8 cents per 100 lb. This rate was not in effect when the above shipments were made, but was restored shortly after. On the shipment referred to charges were collected at a rate of 13 cents per 100 lb. from Catron to Thebes, made up of 5 cents from Catron to Parma, and 8 cents from Parma to Thebes, and a rate of 13 cents per tie from Thebes to Chicago. The commission finds that the rate charged for the movement from Catron to Thebes was unreasonable in that it exceeded the rate of 8 cents per 100 lb., which had been in force before and after the shipment moved, and awards reparation on that basis. (28 I. C. C., 701.)

Unjust Discrimination Found But No Reparation Awarded

New Orleans Board of Trade, Ltd., v. Illinois Central et al. Opinion by Commissioner McChord:

The commission previously found that there was discrimination in that defendants charged for the transportation of unmanufactured tobacco from Henderson and Owensboro, Ky., to New Orleans, for export, 21.5 cents per 100 lb. on traffic destined to Liverpool, 22 cents per 100 lb. when destined to Bristol, and 25 cents per 100 lb. when destined to other European ports. Certain interveners in the case who ship tobacco to Belfast or Dublin have demanded reparation upon shipments which paid the export rate of 25 cents per 100 lb., and take the position that as a matter of law they are entitled to recover the difference between the amount they did pay at the higher rate and the amount they would have paid at the lower rate. The commission finds that no reparation can be awarded. Mere proof of specific shipments made and the freight paid, and the amount for which reparation is sought, does not make out a *prima facie* case. The complainant must also establish the fact of his damage as well as the amount of damages claimed. (29 I. C. C., 32.)

Shipment of Scrap Iron Not Misrouted

Ohio Iron & Metal Company v. Chicago, Milwaukee & St. Paul et al. Opinion by the commission:

The complainants having bought two carloads of scrap iron en route from Milwaukee, Wis., to Newport, Ky., had them reconsigned to the Portsmouth Steel Company, Portsmouth, Ohio, but gave no instructions as to routing except that the shipment should be forwarded only at a rate of \$3.40 per gross ton. The cars were so routed, and arrived on the rails of the Chesapeake & Ohio at South Portsmouth, Ky. That road, since its rails do not reach to Portsmouth, has to unload the freight from cars to drays at South Portsmouth, and ferry these drays across the river to Portsmouth, so that the goods may be delivered at the freight house there. The Portsmouth Steel Company, however, is at New Boston, Ohio, about 4 miles from Portsmouth, but the same rate of \$3.40 per gross ton applies there. The consignee demanded delivery at its plant at New Boston; the C. & O. could only deliver the freight at additional cost, so that the shipment was refused by the consignee, and remained undelivered until demurrage charges had accrued. Delivery was later made by the Baltimore & Ohio Southwestern, but additional draying and switching charges had to be paid for that service by the consignee. The commission finds that the cars were not misrouted, and that the complainant should have consigned the cars to New Boston, or else, having consigned them to Portsmouth, should have informed the carriers of the delivery required, and thus put them on notice as to the service demanded at the rate indicated. (28 I. C. C., 703.)

Rates on Grain and Grain Products

Southwestern Missouri Millers' Club v. St. Louis & San Francisco et al. Opinion by Commissioner Prouty:

Members of the complainant association operate mills in the southwestern part of Missouri, the northwestern corner of Arkansas, the northeastern corner of Oklahoma and the southeastern corner of Kansas. It is alleged that rates from this complaining territory to the southeast are too high as compared with various other points, but attention is mainly directed towards the maintenance of rates from the territory to Memphis, which are unduly high as compared with rates from territories to the west, north and northwest. Complainant desires that these rates be reduced four cents per 100 lb. The commission finds that the

present rates are reasonable. In the case of the Southwestern Missouri Millers' Club v. M. K. & T. Railway it was held that a rate of 23 cents from territory designated as the "Joplin group," which is practically the same as in this case, to Little Rock, should not exceed 20½ cents on wheat and 17½ cents on corn. No reason can be found for changing the decision in that case nor any conditions pointed out which would justify the establishment of a lower rate from this territory to Memphis than to Little Rock. As it is, however, the rates to Memphis are graded upon the basis of distance, but seldom do they exceed 18 cents per 100 lb. The charge of discrimination, therefore, is not sustained. (29 I. C. C., 28.)

Rates on Grain from Omaha and Kansas City to Oklahoma

Omaha Grain Exchange v. Chicago, Rock Island & Pacific. Opinion by Commissioner Clark:

The testimony in this case is directed principally to the relations between proportional rates from Omaha and Kansas City, Mo., to Oklahoma destinations, and to the support of complainant's demand for the establishment of a differential Omaha over Kansas City of three cents per 100 lb. on coarse grain with rates on wheat uniformly one cent per 100 lb. higher. The case is specifically directed against a recent change in Rock Island tariffs, made so that the rates from Omaha to Oklahoma destinations should be at least 5½ cents higher than the rates from Kansas City, as under the general basis, rates from Omaha were predicated upon the Omaha to Kansas City rate of 5½ cents, plus the rate thence to Oklahoma destinations. The Rock Island reaches 200 stations in Oklahoma, but evidence was introduced concerning only 34. The commission finds that the advanced rates are reasonable, that they compare very favorably with the rates prescribed in the case of the Farmers, Merchants and Shippers' Club of Kansas v. A. T. & S. F. The commission does not attempt to discuss the desirability of a fixed differential basis of Omaha over Kansas City, because all of the Omaha and Kansas City to Oklahoma carriers are not before it, and the Rock Island, the only one which is, is not a short line carrier or rate making line from either of the two cities to Oklahoma. (28 I. C. C., 681.)

Lumber Rates from the Southwest to Points North

Report by Chairman Clark:

This investigation involves the propriety of certain proposed increased rates on lumber from points in Arkansas, Louisiana, Missouri, Oklahoma and Texas, also from Memphis, Tenn., to points in Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, South Dakota and Wisconsin. The through rates from the producing territory involved have hitherto been constructed usually on combinations of intermediate rates to and from Cairo, Thebes and East St. Louis, Ill., or St. Louis, Mo., the rates up to these gateways being published in the individual tariffs of originating carriers. A short while ago agent Leland published a single tariff incorporating all these rates but including also a revision of rates and territorial groups, many of the rates being increased. Certain joint rates exceeding the sums of intermediate rates were included, but it is proposed to eliminate those, so that the case is limited to proposed increased rates from points on the Kansas City Southern and St. Louis & San Francisco only. The lumber rates on the former road are stated in five groups. Groups 1 to 4 are far less important than they used to be, whereas, group 5 is still an important producing center. Most of the changes are made in the first four groups. The Kansas City Southern contends that the present rates were originally established on a low basis, compelled by competitive influences which have ceased to exist, and that they are consequently now below the level of rates from the territories with which the mills in groups 1 to 4 are in competition. It is also contended that the proposed rates are reasonable relatively, that is, by comparison with the rates of competing carriers to the same destination and territories, and that the proposed rates are reasonable *per se*. Certain changes in the grouping of the rates on hardwood lumber are advocated because the circumstances and conditions attending the transportation of that product are so dissimilar from those attending yellow pine transportation, as to justify relatively higher rates on the hardwood. The purpose of the Frisco is to eliminate inconsistencies in the rates from certain points on its line and also to bring its rates in line with those

from competitive territory on the lines of other carriers. The commission finds that the contentions of the carriers are justified, noting that the protestant's evidence against the proposed increase on yellow pine is limited to showing the high cost of production resulting from natural disadvantages. Certain changes, however, must be made in the rates on yellow pine and hardwood from points on the Kansas City Southern and the Frisco to Sioux City, so that the rate from group one on the former shall not exceed 23 cents per 100 lb. with rates from the other points to suit. (29 I. C. C., 1.)

The Anthracite Rate Case

The hearing in reference to rates on anthracite coal, which was discontinued in Philadelphia two months ago because of the sudden death of Commissioner Marble, was resumed last week with Commissioner McChord presiding. Testimony was introduced tending to show that the Central of New Jersey favored certain dealers in rental of space where coal is unloaded. Discrimination was charged in the action of the Reading in sending over its telegraph lines telegrams for the Reading Coal Company free. Similar charges of discrimination in telegrams were made against other roads.

E. F. Morgan, accountant for the commission, presented a great mass of figures, taken from the records of the roads, tending to show undue favoritism towards their coal companies. The cost of transportation from the Wyoming region to New York Harbor was given as a trifle less than 60 cents a gross ton, distance 160 miles, these figures including assembling cost, line haul, terminal cost and return of empty cars. The freight rates on coal are from \$1.10 a ton to \$1.55, the latter being the rate on prepared sizes. The Central of New Jersey had made allowances to the Lehigh Coal & Navigation Company for handling coal at the New York terminus, which allowances were said not to have been properly noted in the published tariff rates. It appears that these allowances were long since discontinued. Records were given of other allowances said to be discriminatory. It was charged that the Central of New Jersey carried coal in vessels to New England for the Lehigh & Wilkes-Barre Coal Company, at a loss; and that the Manhattan Lighterage Company was operated by the road at a loss. Figures were given tending to show that the Philadelphia & Reading had paid exorbitant sums for freight cars leased.

The commission has now finished presenting testimony against the roads and will in the near future hold hearings at New York to receive testimony offered by the railroad companies.

STATE COMMISSIONS

The Railroad Commission of Wisconsin has ordered the Chicago, Milwaukee & St. Paul to stop its eastbound Olympian train at Kilbourn, Wis., or at its option, to restore the eastbound train which formerly was run from New Lisbon to Portage.

The Public Service Commission of New Hampshire has suspended, until August 1, new tariffs recently filed by the express companies showing rates for the transportation of merchandise in that state. The suspended tariffs increased the rates in many cases for short distances.

The Railroad and Public Service Commission of Montana has filed a complaint with the Interstate Commerce Commission asking lower rates on carload shipments of corn, rye, oats, wheat, flax seed and millet seed from Montana points to St. Paul, Minneapolis, Duluth, Seattle, Tacoma and Portland.

The Pennsylvania Water Supply Commission has granted permission to the Western New York & Pennsylvania to change the course of Oil creek and to build a bridge at Spartansburg, Crawford county; the Pittsburgh & Lake Erie to build a four-span arch bridge over the Beaver river at Newport; the Pennsylvania Railroad for two pipe lines through Turtle creek, and the Pennsylvania Company for a bridge over Shenango river at New Castle.

The Pennsylvania Public Service Commission gave an all-day hearing at Harrisburg, January 20, on the questions that

have arisen as to the applicability of the public service company act of 1913 to issuance of passes to wives and families of employees, reduced rates to clergymen, etc. The commission reserved decision, although remarks by commissioners indicated a desire to have the questions raised in a formal complaint and an issue joined.

The Corporation Commission of Oklahoma has imposed a fine of \$1,000 on the Missouri, Kansas & Texas for disobedience of an order of the commission requiring freight to be moved within 24 hours after being loaded, and to be carried forward at the rate of at least 50 miles a day. The same company has been fined by the commission for five violations of an order forbidding a road to charge more than two cents a mile fare for passengers.

The Illinois Public Utilities Commission has issued an official ruling giving its interpretation of the anti-discrimination clause of the law creating the commission as it applies to passes or free services rendered by railroads and other public utilities. The ruling follows in general the provisions of the Interstate Commerce law, but holds that passes may be given to policemen, firemen, letter carriers, etc., when provided for in contract ordinances of municipalities.

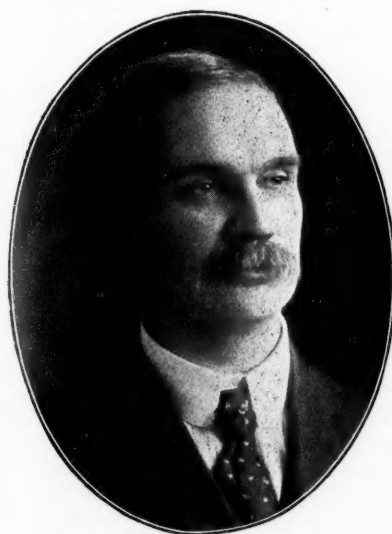
Complaints have been filed with the Missouri Public Service Commission by two theatrical companies of St. Louis against the Missouri Pacific, the Wabash, the Chicago & Alton, the Chicago Rock Island & Pacific, and the Chicago, Burlington & Quincy, alleging violation of the laws of the state in agreeing to discontinue midnight trains from St. Louis to Kansas City, which were withdrawn on January 4. The commission is asked to issue an order directing one or all of the roads to run a midnight train.

PERSONNEL OF COMMISSIONS

Alonzo G. Pack, of Colorado, has been nominated by President Wilson as assistant chief inspector of locomotive boilers for the Interstate Commerce Commission, succeeding Frank McManamy, promoted.

The state of Idaho now has a Public Utilities Commission, the members of which are John A. Blomquist, chairman, Axel P. Ramstedt and D. W. Standrod. The office of the commission is at Boise, the capital of the state.

George H. Bremner, engineer of the Illinois district of the Chicago, Burlington & Quincy at Chicago, has been appointed assistant district engineer with the board of valuation engineers, Interstate Commerce Commission, for the Central district, with headquarters at Chicago. Mr. Bremner was born December 17, 1861, at Marshalltown, Iowa, and was graduated from the University of Iowa in 1883 with the degree of C. E. He began railway work in 1880 as draftsman on construction work for the Chicago, Burlington & Quincy, and from June to September, 1883, was rodman on construction of the Chicago, St. Paul & Kansas City. He was then transitman on maintenance of way, Chicago & North Western until May, 1884, when he returned to the Burlington



G. H. Bremner

as transitman on preliminary surveys. In August of that year he was draftsman on construction for the Chicago, Burlington & Northern, and in December of the following year he was promoted to division engineer maintenance of way of the Chicago, Burlington & Quincy. From April, 1889, to June, 1890, Mr.

Bremner was transitman in charge of party on location of the St. Louis, Keokuk & Northwestern extension (a part of the Burlington system) from Old Monroe to St. Louis, Mo. He was then assistant engineer maintenance of way of the Burlington at Chicago, and 12 years later, in June, 1902, was made engineer of the Illinois district. From November, 1904, to April, 1908, he was engineer maintenance of way of the same district, and on the latter date became engineer of that district, which position he now resigns to accept that of assistant district engineer with the board of valuation engineers of the Interstate Commerce Commission, as above stated.

Albert J. Nixon, chief operating officer of the Canadian Railway Commission, died at his home in Ottawa, January 13. Mr. Nixon was born in Waterloo, Que., and was in the service of the Grand Trunk for about 20 years prior to his appointment as an officer of the commission in 1909.

George T. Bradley, of Ouray, Colo., has been appointed a member of the State Railroad Commission of Colorado for a term of six years, succeeding Daniel H. Staley, whose term has expired. Mr. Bradley has been a merchant and a mine manager, and prior to this appointment was chairman of the Democratic State Central Committee.

The body which regulates transportation matters in the state of Nevada is entitled "Railroad Commission and Public Service Commission." The chief commissioner is H. F. Bartine; first associate commissioner, J. F. Shaughnessy, second associate commissioner, W. H. Simmons. The office of this board is at Carson City, and the secretary is E. H. Walker.

COURT NEWS

Sixteen Texas railways have filed suit in the United States District Court to set aside an order of the Interstate Commerce Commission requiring the publication of through rates on interstate and foreign cotton shipments through Port Aransas.

The Supreme Court of the United States has affirmed the judgment of the federal district court in Vermont, which held that the Public Service Commission of that state had no authority to order the Rutland Railroad to improve its station building at Vergennes.

The Atchison, Topeka & Santa Fe and the Chicago & Alton have served notice on Attorney General Barker of Missouri of their intention to seek to remove from the state to the federal courts the suits filed by the attorney general to collect refunds of excess charges collected by the railways during the litigation of the state rate cases.

The Illinois Central has notified the state auditor of Illinois of its intention to carry to the Illinois Supreme Court an appeal from the auditor's recent ruling adding over \$2,000,000 to the company's taxes for 1913. The auditor is requested to transmit to the clerk of the court a certified copy of the valuation on which he claims the increased tax.

Judge Trieber of the United States District Court has issued an injunction restraining suits in other courts against the railways of Arkansas to collect refunds of overcharges collected by the railways during the litigation of the state rate cases. The court holds that all such claims must be presented to a master in chancery appointed by the federal court.

The Supreme Court of the United States this week handed down a number of decisions limiting the field of dispute between state and federal courts on questions of jurisdiction. In a Vermont case the court upheld the right of railroads to initiate proceedings to test state rates in the federal courts rather than in the Supreme Court of Vermont. In a Kentucky case the court held that state courts must accept as true alleged facts set forth in petitions for removing cases from state to federal courts. Under this ruling attacks upon the truthfulness of the petition must be postponed until the case gets into the federal court. In a case which arose in Mississippi the court upheld the right of federal courts to dismiss a proceeding because the suit was not begun with sufficient service in the state court.

Railway Officers

Executive, Financial, Legal and Accounting

P. L. Overman, special accountant of the Virginian Railway, has been appointed freight auditor of the Western Maryland, with headquarters at Baltimore, Md., succeeding J. F. Shea, resigned.

W. C. Hurst, who on January 1 became vice-president and general manager of the Chicago, Peoria & St. Louis, as has already been announced in these columns, began railway work as water boy for a track gang, and was then track laborer and yard clerk. Later he was employed in the engineering department successively as rodman, assistant engineer, resident engineer and engineer of construction. From April, 1893, to July, 1903, he was with the Chicago, Burlington & Quincy lines in Missouri, being employed in the maintenance of way, transportation, engineering and construction departments. He was then for two years assistant superintendent of the Illinois division of the Missouri Pacific, and from June, 1905, to October of that year was engaged on special work in the general manager's office of the Ann Arbor and the Detroit, Toledo & Ironton. He next became superintendent of the latter road at Springfield, Ohio, resigning October, 1906, to go to the Pere Marquette as trainmaster at Traverse City, Mich. In January, 1908, he was promoted to chief clerk to the president and general manager, and in May, 1910 left the Pere Marquette to become superintendent of the Cincinnati, Hamilton & Dayton at Dayton, Ohio, resigning in October, 1911. During the month of April, 1912, Mr. Hurst was engaged in special work in the assistant general manager's office of the Pere Marquette, and in June was appointed general superintendent of the Chicago, Peoria & St. Louis. In August, 1913, he was made general superintendent of the Eastern district of the Pere Marquette at Saginaw, Mich., which position he resigned to return to the Chicago, Peoria & St. Louis, as vice-president and general manager, as above noted.



W. C. Hurst

Operating

H. T. Malcolmson, car accountant of the Toronto, Hamilton & Buffalo, at Hamilton, Ont., has been promoted to superintendent of car service, with office at Hamilton, Ont.

C. E. Carson has been appointed superintendent of the Ft. Dodge, Des Moines & Southern, with office at Boone, Iowa, succeeding F. K. Shuff, assigned to other duties.

T. B. Burgess, supervisor of locomotive operation of the Baltimore & Ohio at Wheeling, W. Va., has been appointed trainmaster of the Chicago division, with headquarters at Garrett, Ind.

H. W. Rives has been appointed superintendent of the Deerling Southwestern, with headquarters at Caruthersville, Mo., succeeding as superintendent W. I. Converse, formerly secretary treasurer and superintendent, who has been transferred from Caruthersville to Chicago.

W. J. Bell, superintendent of the Columbus division of the Southern Railway, with headquarters at Williamson, Ga., has been granted leave of absence on account of ill health. H. G.

Farrar, trainmaster at Birmingham, Ga., succeeds Mr. Bell. Charles Chandler, trainmaster on the Northern Alabama Railway at Sheffield, Ala., succeeds Mr. Farrar, and B. Haggard succeeds Mr. Chandler.

W. D. Scott, who, effective January 2, was appointed general superintendent of the Spokane, Portland & Seattle and Oregon Trunk, has been appointed general manager of those roads and the Oregon Electric and the United Railways, with headquarters at Portland, Ore., effective on January 7. Mr. Scott will have jurisdiction over the operating, mechanical and purchasing departments, and the office of general superintendent is abolished.

B. E. Terpnig, superintendent of passenger terminals of the Chicago & North Western at Chicago, has been appointed superintendent of the East Iowa division, with headquarters at Belle Plaine, Iowa, succeeding William Walliser, who has been appointed assistant to the general managers, with office at Chicago. W. D. Beck, superintendent of dining and parlor cars at Chicago, succeeds Mr. Terpnig, and C. H. Shircliffe, assistant superintendent of dining and parlor cars, succeeds Mr. Beck.

Traffic

J. P. Billups has been appointed general passenger agent of the Georgia Railroad, with office at Augusta, Ga.

H. H. Brigham has been appointed manager of the Nickel Plate-Lackawanna Dairy Line, with headquarters at Chicago.

H. W. Wheeler, traveling freight agent of the Belt Railway of Chicago, has been promoted to assistant general freight agent at Chicago.

C. L. Chapman, assistant to general traffic manager of the Erie at New York, has been appointed assistant general traffic manager, with office at New York.

C. L. Kennedy has been appointed commercial agent of the Chicago, Milwaukee & St. Paul at St. Paul, Minn., in place of Frank E. Otis, promoted.

B. H. Wallace, soliciting agent of the Louisville & Nashville at Memphis, Tenn., has been appointed traveling freight agent, with headquarters at Buffalo, N. Y., and E. H. Wigand succeeds Mr. Wallace.

G. V. Holton, contracting freight agent of the Illinois Central at Minneapolis, Minn., has been appointed traveling freight agent, with headquarters at Indianapolis, Ind., in place of J. H. Boodro, who has been transferred to Carbondale, Ill., in a similar capacity. C. A. Francois succeeds Mr. Holton. A. C. Green has been appointed contracting freight agent at Cleveland, O.

The following appointments are announced on the El Paso & Southwestern System, effective February 1: R. B. Crocker, traveling freight and passenger agent, with headquarters at Chicago, succeeding J. F. Hogan, transferred to Kansas City, Mo., as general agent; D. A. Davies, commercial agent at Detroit, Mich.; Fred D. Ogden, traveling freight and passenger agent, with office at San Francisco, Cal.; J. R. Perry, contracting agent at Los Angeles, Cal.; Orno M. Brown, formerly general agent of the Western Maryland at New York, contracting agent at Chicago.

Engineering and Rolling Stock

E. Sullivan has been appointed roadmaster of the Chicago, Rock Island & Pacific at Washington, Iowa, in place of C. Flynn.

B. F. Crowley has been appointed supervisor of locomotive operation of the Baltimore & Ohio, with headquarters at Wheeling, W. Va., succeeding T. B. Burgess, transferred.

J. A. Griffin, assistant engineer of the Southern Railway, at Norcross, Ga., has been appointed engineer of maintenance of way and structures of the Georgia Southern & Florida, with headquarters at Macon, Ga.

E. B. Hall, division master mechanic of the Chicago & North Western at Chicago, has been appointed assistant to the general superintendent of motive power and car departments, with headquarters at Chicago.

George H. Bremner has resigned as engineer of the Illinois district of the Chicago, Burlington & Quincy to become assistant district engineer with the board of valuation engineers, Interstate Commerce Commission, with office at Chicago.

J. G. Dole, general foreman of the Chicago, Burlington & Quincy lines west of the Missouri river at Lincoln Neb., has been appointed master mechanic of the Alliance division, with headquarters at Alliance, Neb., succeeding T. J. Raycroft, resigned; effective January 16.

William Lanon has been appointed supervisor of locomotive operation of the Arkansas, Indian Territory and Louisiana divisions of the Chicago, Rock Island & Pacific, with headquarters at Little Rock, Ark., succeeding S. T. Patterson, who has been appointed supervisor of locomotive operation of the Chicago terminal and Illinois divisions in place of R. E. Wallace, assigned to other duties.

F. I. Cabell, chief engineer of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana at Richmond, Va., in addition to performing the duties of chairman of the federal valuation committee, will resume the duties of chief engineer, and W. F. Steffens, assistant chief engineer at Richmond, Va., having resigned to accept service with another company, L. B. Allen, engineer maintenance of way at Covington, Ky., has been appointed assistant chief engineer, with office at Richmond.

Special

H. R. Buckey, agent of the land and industrial department of the Southern Railway at Denver, Col., has been appointed agent of the same department, with headquarters at Bristol, Tenn., succeeding R. J. Hanson, Jr., resigned.

The authority of M. V. Richards, land and industrial agent at Washington, D. C.; C. W. Fitch, agent, at Macon, Ga., and Charles Davies, traveling immigration agent of the land and industrial department of the Southern Railway, has been extended over the Macon & Birmingham and the Hawkinsville & Florida Southern.

OBITUARY

Henry W. Griffith, assistant secretary of the Norfolk & Western, with headquarters at Philadelphia, Pa., died suddenly on January 15, in New York City.

Richard D. Lankford, vice-president and secretary of the Southern Railway, also of various subsidiary companies, with headquarters at New York, died on January 15 at his home in Brooklyn, N. Y. His death was due to the accidental turning on of illuminating gas in his bath room. While Mr. Lankford's duties were connected rather with the treasury department and the secretaryship than with the constructive work of rehabilitating the physical property and operation of the Southern Railway, his loyal devotion to the South, to the Southern Railway and to his company's interests made him deeply trusted and respected by his president and board of directors. He was one of those fine type of men who are never too busy to be



R. D. Lankford

courteous and who yet accomplish their own work and are always ready to help an associate or subordinate with their work. He was a man whom it was a privilege to have as a friend and one with whom it was a pleasure to do business. Mr. Lankford was born on February 28, 1867, in Somerset

county, Maryland, and was educated at Washington High School, Princess Anne, Md. He began railway work on September 1, 1887, as clerk and acting auditor on the Maryland Central at Baltimore, Md., and from June, 1889, to February, 1892, was auditor and treasurer of the Roanoke & Southern, now a part of the Norfolk & Western. From March to December, 1892, he was in the accounting department of the Norfolk & Western. He went to the Southern Railway on June 1, 1894, as cashier, and had been in the employ of that road continuously ever since, serving consecutively as assistant secretary, secretary and vice-president. He also held office in various subsidiary companies.

Albert W. Martin, formerly superintendent of the Boston division of the New York, New Haven & Hartford, with headquarters at Boston, Mass., died on January 12, in that city, at the age of 62. Mr. Martin had held various positions on the New Haven, including that of chief clerk to general manager at Boston, assistant general manager for the lines east of New Haven, and as superintendent of the Boston division, from which position he was pensioned about a year and a half ago. He had also held the position of manager of the Boston Terminal Company.

Herbert DeWayne Carter, assistant freight traffic manager of the New York Central Lines East of Buffalo, N. Y., with office at New York City, died suddenly at Brooklyn, N. Y., on January 18. He was born on October 16, 1860, at Watertown, N. Y., and was educated in the common schools of his native town. In 1873, he was a messenger of the Dominion Telegraph Company and from 1874 to 1875 was telegraph operator of the Montreal Telegraph Company at Watertown. He began railway work in 1875 as telegraph operator on the Rome, Watertown & Ogdensburg, now part of the New York Central & Hudson River; the next year he was made clerk in the general freight office of the same road, being appointed chief clerk in



H. D. Carter

1881. From July, 1888, to June, 1890, he was a clerk in the division freight office of the Philadelphia & Erie and the Northern Central, now part of the Pennsylvania Railroad, at Williamsport, and then after serving one year in the general freight office of the Philadelphia & Reading he was made assistant general freight and passenger agent of the Adirondack & St. Lawrence. From May, 1893, when the A. & S. L. was consolidated with the New York Central & Hudson River, until April, 1902, he was division freight agent and general agent of the passenger department of the New York Central & Hudson River at Herkimer, N. Y., and at Malone, and then to July, 1904, he was assistant general freight agent of the same road and the West Shore at New York, becoming general freight agent of the West Shore in July, 1904. He remained in that position until October, 1906, when he was made general freight agent of the New York Central & Hudson River, and in May, 1907, was promoted to assistant freight traffic manager of the New York Central Lines East of Buffalo.

TRAIN IN INDIA ATTACKED BY OUTLAWS.—Recently the mail train from Peshawar to Calcutta was stopped during the night at Jehangira by a small band of Pathan outlaws. The Indian fireman and the European engineman and a brakeman were shot dead. The outlaws would have looted the cars but gave up their attempt and disappeared on finding themselves faced by four British officers and some native soldiers.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE GAINESVILLE & NORTHWESTERN has ordered one 10-wheel locomotive from the Baldwin Locomotive Works.

THE ALABAMA, FLORIDA & SOUTHERN has ordered one 10-wheel locomotive from the Baldwin Locomotive Works.

THE EAST BROAD TOP RAILROAD & COAL COMPANY has ordered one mikado type locomotive from the Baldwin Locomotive Works.

THE FORT WORTH BELT has ordered one six-wheel switching locomotive from the American Locomotive Company. The locomotive will have 19 x 26 in. cylinders, 51 in. driving wheels, a total weight in working order of 132,000 lb. and a steam pressure of 180 lb.

THE DELAWARE, LACKAWANNA & WESTERN is in the market for 14 Pacific type locomotives for fast freight service, and 4 of the same type for passenger service. The Lackawanna is also about to build 6 10-wheel switch engines in its shops at Scranton, and has already ordered such new material as it will need for them.

THE TEXAS, OKLAHOMA & EASTERN has ordered one prairie type and one ten-wheel type freight locomotive from the American Locomotive Company. The former will have 16 x 24 in. cylinders, 46 in. driving wheels, a total weight in working order of 110,000 lb. and a steam pressure of 180 lb. The latter will have 18 x 24 in. cylinders and 50 in. driving wheels, a total weight in working order of 132,000 lb. and a steam pressure of 180 lb.

THE NORTHWESTERN PACIFIC, reported in the *Railway Age Gazette* of December 17 as being in the market for 4 8-wheel and 2 10-wheel passenger locomotives, has ordered that equipment of the American Locomotive Company. The 8-wheel locomotives will have 19 x 26 in. cylinders, 63 in. driving wheels, a total weight in working order of 155,000 lb. and a steam pressure of 200 lb. The 10-wheel locomotives will have 20 x 28 in. cylinders, 63 in. driving wheels, a total weight in working order of 180,000 lb. and a steam pressure of 200 lb.

CAR BUILDING

THE KANAWHA & MICHIGAN has ordered 5 steel coaches from the American Car & Foundry Company.

THE NEW ENGLAND COAL & COKE COMPANY has ordered 200 hopper cars from the Pressed Steel Car Company.

THE NEW YORK CENTRAL & HUDSON RIVER is building a number of steel dining cars at its West Albany shops.

THE GASTINEAU MINING COMPANY has ordered 100 freight cars from the American Car & Foundry Company for use in Alaska.

THE BUFFALO CREEK & GAULEY, which was in the market for 200 hopper cars a short while ago, has ordered that equipment of the Pressed Steel Car Company.

THE ATCHISON, TOPEKA & SANTA FE has ordered 500 box and 300 furniture cars from the American Car & Foundry Company and 200 tank cars from the Pressed Steel Car Company.

THE UNION PACIFIC, which was reported in the *Railway Age Gazette* of December 19 as being in the market for 5,000 freight cars, is said to have increased that inquiry to 12,500 freight cars.

THE ILLINOIS CENTRAL, reported in the *Railway Age Gazette* of January 16, as having ordered 100 express refrigerator cars from the American Car & Foundry Company, placed orders for 150 such cars with that company.

Supply Trade News

The Metal Car Seal Company, Chicago, manufacturing the Edgar steel seal, has changed its name to the Edgar Steel Seal and Manufacturing Company.

The Chicago sales office of Charles R. Long, Jr., & Co., and the headquarters of Harry Vissering & Co., Inc., have been removed from the Great Northern building to the sixteenth floor of the Lytton building, Jackson boulevard and State street.

Frank D. Waller, formerly secretary of the Flower Waste & Packing Company, New York, manufacturers of Resilient journal box packing, has become the owner of that company. The company in the future will not only be able to supply Resilient packing, but also packing of all kinds, wiping waste and general supplies.

The annual report of the Automatic Electric Company, Chicago, for the year ending December 31, 1913, shows gross receipts of \$903,382, as compared with \$855,999 for 1912. The net profit for the year, after deducting general expenses, replacements, bond interest, etc., was \$478,009, an increase of \$187,984 over 1912.

The United States Light & Heating Company, Niagara Falls, N. Y., has changed the location of its New York City branch sales office from 30 Church street to 210 West 50th street. This change puts the New York U-S-L service station and sales office in the same building. The general offices of the company will remain at 30 Church street.

A. E. Schafer, who has been general sales manager of the Sherwin-Williams Company, has accepted a position with the Flint Varnish Works, Flint, Mich. He will assist President W. W. Mountain in the management, and will have full charge of the railroad department. Mr. Schafer was with the Sherwin-Williams Company for 28 years, the last 6 years as general sales manager.

The Des Moines Bridge & Iron Company, of Pittsburgh, Pa., and Des Moines, Iowa, opened a contracting office at 50 Church street, New York, on January 1. J. E. O'Leary, one of the company's contracting engineers, is in charge of the office, which will handle the business of the company in the coast states north of Virginia and in Eastern Canada. The Des Moines Bridge & Iron Company makes a specialty of the design and construction of hemispherical bottom steel tanks on steel towers for municipal, railway and industrial work.

Peter M. Kling has been appointed assistant to the president of the Laconia Car Company, with headquarters at Laconia, N. H. Mr. Kling was vice-president and general manager of the St. Louis Car Company for a number of years, and later acted in the same capacity with the John Stephenson Company until that company was sold to the J. G. Brill Company. He then went with the Pressed Steel Car Company, where he was for several years manager of the passenger car department, which he organized, and in this position he had charge of the building of all steel passenger cars. For the past year he has been connected with the Brooklyn Rapid Transit Company.

At the annual meeting of the Association of Manufacturers of Chilled Car Wheels, recently held in New York, the following officers and members of the executive committee were chosen: President, T. A. Griffin, Griffin Car Wheel Company, Chicago; vice-presidents, E. F. Carry, vice-president and general manager, American Car & Foundry Company, Chicago; J. A. Kilpatrick, president, Albany Car Wheel Company, Albany, N. Y.; secretary and treasurer, George W. Lyndon, Chicago; executive committee: W. C. Arthurs, J. D. Rhodes, S. F. Pryor, F. B. Cooley, C. A. Lindstrom, A. J. Miller, A. G. Wellington. Twenty-five companies are now represented in the association.

Edwin Emerson Nolan, head of the materials disposition department of the Westinghouse Electric & Manufacturing

Company, East Pittsburgh, Pa., died at his home in Wilkesburg, Pa., on Tuesday, January 13. Mr. Nolan was born in Chicago, August 10, 1857. He received his early education in Mexico and from his sojourn among the foreign population acquired a ready speaking knowledge of several foreign languages, an acquirement which he was well able to use later in life. He began work with the Westinghouse Electric Company in 1887, at just about the time it began operations on Garrison Alley, in Pittsburgh. He was subsequently made superintendent of the Allegheny factory of the company and as such had charge of building the first alternating current generator for the Niagara plant, an installation which afterwards became famous throughout the world. In 1898, Mr. Nolan was sent by the Westinghouse Electric & Manufacturing Company to France to establish a factory at Havre. He remained there until 1902, when he returned to the United States to be placed, on account of his familiarity with Westinghouse apparatus, in charge of the materials disposition department, a position which he held until his death.

TRADE PUBLICATIONS

AIR DRILLS.—The Independent Pneumatic Tool Company, Aurora, Ill., has recently issued a circular describing the Thor roller bearing piston air drill. The several types of drills manufactured by the company are illustrated, and a table of capacities and general specifications is included.

HEATING, CHILLING AND DIE PRESSES.—The Watson-Stillman Company, Aldene, N. J., has recently issued a catalog describing and illustrating the company's line of heating, chilling and die presses. Specifications are given for each size and type of press, as well as an indication of the kind of work for which each is best fitted.

SPEED RECORDERS.—The Chicago Pneumatic Tool Company, Chicago, has utilized bulletin No. 166 to describe the new Boyer speed recorder with clock attachment. The speed recorder has been on the market for 20 years. The clock attachment is something new and has been added without in any way altering the machine, for the purpose of recording graphically the time at all points during the trip of the locomotive on which the recorder is used.

BLOCK SIGNALS.—The General Railway Signal Company, Rochester, N. Y., has recently issued a very attractive bulletin, entitled "Alternating Current Block Signals on the Southern Railway." The author of the booklet is W. J. Eck, signal and electrical engineer of the Southern Railway. Mr. Eck gives a very elaborate description of the new automatic block installation which replaced a manual block system of 19 block stations on a hundred miles of main line in North Carolina. He goes into very great detail, describing very carefully all of the various factors of the installation, such as the transmission line, the poles, power station, wiring, track insulation, the track and signal circuits, as well as the signals themselves, which are of the three-position type, operating in the right-hand upper quadrant. The booklet is very well illustrated, containing very neat views of the various parts of the installation and of the signals themselves. A bulletin plan of the installation is also included.

FIRST UNDERGROUND RAILWAY IN JAPAN.—The first underground railway in Japan is to be a miniature underground tube connecting the new railway station at Tokio with the post office. The railway will be 1,500 ft. in length and is planned for the service of expediting and facilitating the handling of mail matter.

RAILWAY CONSTRUCTION IN INDIA.—The South Indian has recently received the sanction of the central government of India to construct an additional 40-mile metre gage line in the prosperous native state of Travancore on the southwest coast of India. The line is to extend from the important port of Quilon to Trevandrum, the capital and largest town in the state. The construction of the new road is to be undertaken in behalf of Travancore Durbar, and will be known as the Quilon-Trevandrum extension of the Tinnevely-Quilon Trevancore Railway. The new road should contribute largely to the development of a rich agricultural section through which it will extend, and material benefit will undoubtedly result from the connection by rail of the chief port with the capital of the state.

Railway Construction

ALBUQUERQUE, CORTEZ & SALT LAKE.—We are told that the plans call for building from Albuquerque, N. Mex., northwest, thence through the Montezuma valley of Colorado, near Cortez, to Salt Lake City, Utah. The location and surveys have been completed to a point near Montezuma county line in Colorado working toward Salt Lake City. The W. K. Palmer Engineering Company, Kansas City, Mo., are the engineers in charge of all of the locations, surveys, etc. (Jan. 16, p. 149.)

GULF & BAY.—An officer writes that this company, which was recently incorporated in North Carolina, expects to let contracts in March to build from Belva, N. C., northeast, via White Rock to Carmen, 10 miles. The maximum grades will be 2 per cent. and the maximum curvature 17 deg. There will be 10 small trestles on the line, which is being built to carry lumber, wood bark and ore. A. G. Butts, president, Stackhouse, and W. N. Garrett, chief engineer and secretary, Hot Springs. (January 16, p. 149.)

GULF & PACIFIC.—Incorporated in Texas with \$125,000 capital and headquarters at Sweetwater. The plans call for building from Sweetwater, Tex., southeast through the counties of Nolan, Taylor, Runnels, Callahan, Coleman, Brown, Eastland and Comanche to the town of Comanche, about 125 miles. The incorporators include: J. V. Holmes, E. O. Wedge, W. Wright, B. Anthony, J. G. Johnson, M. J. Healy and H. C. Hoard, all of Sweetwater.

IDAHO PACIFIC.—An officer writes that the prospects of building this line are good. The plans call for building from Bliss, Idaho, south via Hagerman, to Castleford, about 30 miles. Grading work has been finished from Bliss to Hagerman. The work on the first four miles out of Hagerman will be heavy. There will be one 400 ft. steel bridge, at Snake river crossing. The company expects to develop a traffic in farm products and general merchandise at first, and later, in the products of mines and live stock. M. J. Sweeley, president, Twin Falls, Idaho, and W. C. Burke, chief engineer, Oklahoma City, Okla.

INDIANAPOLIS & FRANKFORT.—See Pennsylvania Lines West.

INTERCOLONIAL RAILWAY.—A contract has been given to the Union Construction Company, Limited, North Sydney, N. S., it is said, to build a branch from North Sydney to a junction with the main line near Leitch's Creek. (Nov. 7, p. 891.)

KANSAS CENTRAL TRACTION.—This company has surveys made for building a line from Columbus, Kan., west to Altamont, it is said, about 30 miles, and has ties and other material on the ground. The company also plans to build southwest from Altamont to Coffeyville, about 25 miles. Residents of Columbus, it is understood, will give a bonus in aid of the project.

KENTUCKY ROADS (ELECTRIC).—Eastern capitalists are said to be back of a project to build a line from Central City, Ky., southwest to Greenville, also a line from Central City southeast to Drakesboro, in all about 15 miles.

MINNEAPOLIS, MERRILL & MARINETTE.—An officer of this company, which was organized last year with \$400,000 capital, writes that the company has amended its charter and expects to let contracts early this coming spring to build from Merrill, Wis., southwest to a point near Athens. A connection will be made at Athens with the Minneapolis, St. Paul & Sault Ste. Marie. John O'Daly, president, Merrill. (June 6, p. 1244.)

MISSISSIPPI NORTHWESTERN.—See Pensacola & Missouri Valley.

NEW YORK SUBWAYS.—Bids are wanted by the New York Public Service Commission, First district, on February 9, for building Section No. 1 of Route No. 18, from the present terminus of the Lenox avenue branch in the borough of the Bronx, to Burke avenue, where it joins Section No. 2. Bids are also wanted on February 10, to build Section No. 2 of Route No. 16, from about One Hundred and Eighty-second street to Woodlawn road. Both of these sections are to be three-track elevated lines. (January 16, p. 149.)

NIAGARA, WELLAND & LAKE ERIE (Electric).—An officer writes that this company now operates 1.5 miles of road in the city of Welland, Ont., and proposes to build an extension south via Dainville and Port Colburn to Fort Erie, 28 miles; also to build an extension northeast via Port Robinson to Niagara Falls, 12.5 miles. H. C. Schofield, president, Toronto; T. R. Cummins, engineer, Welland.

OKLAHOMA, NEW MEXICO & PACIFIC.—This company, which started work some time ago on a line from Ardmore, Okla., west to Waurika, may build an extension northwest to Lawton, about 30 miles from Waurika. The company now operates 20 miles from Ardmore west to Wilson and has track laid west of Wilson on 10 miles. A branch may also be built from the new town of Ringling north to Oklahoma City. (October 31, p. 844.)

PENSACOLA & MISSOURI VALLEY.—We are told that this company plans to build from Pensacola, Fla., northwest via Waynesboro, Miss., Friar Point, Sedalia, Mo., and St. Joseph, to Omaha, Neb., and that the prospects of building the line are good. A branch is projected from Pascagoula, Miss., north to Waynesboro, thence northeast via Tuscaloosa, Ala., to Birmingham, and another branch from Carthage, Miss., west via Yazoo City, thence northwest via Greenville to Clarksville, Ark. Contracts to carry out the work are pending, and 42 miles of track has been laid. The company expects to develop a traffic in lumber, timber, coal, cotton, grain, fruit, livestock and merchandise. The headquarters of the company are at Pascagoula, Miss., and W. G. Seaver, Pascagoula, president of the Mississippi Northwestern, which was organized some time ago to build from Pascagoula to Omaha, may be addressed.

PENNSYLVANIA LINES WEST.—An officer writes that the Indianapolis & Frankfort has been incorporated in Indiana with a capital of \$60,000, to build from Indianapolis, Ind., northwest to Frankfort, 55 miles. J. J. Turner is president of the new company at Pittsburgh, Pa., and F. T. Hatch, chief engineer, St. Louis, Mo.

SALINA CANYON.—An officer of this company, which was organized last year in Utah with \$1,000,000 capital to build a 35-mile line from Salina, Utah, through Salina canyon writes that the company expects to begin work as soon as approval is received from the United States government to build through the forest reserve. J. Tingree, president, Ogden. (November 14, p. 940.)

SAN PEDRO, LOS ANGELES & SALT LAKE.—This company has started work, it is said, on a branch from Delta, Utah., southwest to Hinckley, about 8 miles.

UNION TRACTION COMPANY.—It is understood that a branch is to be built from Deering, Kan., west through Montgomery county to Caney, about 15 miles.

RAILWAY STRUCTURES

AUGUSTA, GA.—The Charleston & Western Carolina has given a contract to T. O. Brown & Sons, and work is now under way putting up a new freight house. The building will be 60 ft. by 405 ft., and will cost between \$20,000 and \$25,000.

MEMPHIS, TENN.—The Fox Construction Company, of El Reno, Okla., has been awarded a contract for constructing a subway on Georgia avenue, which will form part of the approach to the new freight terminal to be built by the Chicago, Rock Island & Pacific.

MORRISTOWN, N. J.—An officer of the Delaware, Lackawanna & Western writes regarding the report that a concrete arch bridge is to be built to eliminate a grade crossing at Morristown; that the company is negotiating with the city officers for the construction of the bridge. If a satisfactory agreement is reached the railway company will put up a reinforced concrete structure with its own forces.

RAILWAY CONSTRUCTION IN SIBERIA.—It is reported that the Lena Gold Fields Company has asked permission to build a 670-mile railroad from Irkutsk to Bodaibo. This request will have to be passed upon by high authority, as certain exceptional privileges are also desired.

Railway Financial News

BOSTON & MAINE.—It is unofficially announced at Boston that holders of more than 75 per cent. of the \$10,000,000 5 per cent. one-year notes due February 3 have agreed to renew their notes for four months on a 6¾ per cent. basis.

A bill was introduced in the Massachusetts legislature on January 15 providing for the purchase by the state of Massachusetts of the stock held by the Boston Railroad Holding Company (a subsidiary of the New Haven) and the cancellation of this stock and substitution therefor of bonds to be guaranteed by the state and sold to the public.

CLARION & FRANKLIN.—See Lake Erie, Franklin & Clarion.

LAKE ERIE, FRANKLIN & CLARION.—This is the name under which the Pennsylvania Southern, the Pennsylvania Northern & Pittsburgh and the Clarion & Franklin have been merged.

MINNEAPOLIS & ST. LOUIS.—Newman Erb, president, is quoted as saying that the company has made arrangements to pay off \$500,000 of the \$3,000,000 maturing notes and to provide for the retirement of the remainder by the sale of \$2,500,000 two-year 6 per cent. notes to Speyer & Co., New York, and to pay off about \$1,000,000 floating debt through the sale of treasury bonds.

NATIONAL RAILWAYS OF MEXICO.—*The Wall Street Journal* says that holders of the prior lien 4½ per cent. bonds, National Railroad prior lien 4½ per cent. bonds and Mexican Central priority 4 per cent. bonds are responding favorably to the offer of the company to issue 3-year 6 per cent. notes in lieu of interest payments. It is estimated that about 75 per cent. of the holders of these bonds live abroad.

NEW YORK, CHICAGO & ST. LOUIS.—The annual dividend on the \$14,000,000 common stock, of which the Lake Shore & Michigan Southern owns \$6,240,000, has been omitted. In 1913 four per cent. was paid, and in 1912 three per cent.

NEW YORK, NEW HAVEN & HARTFORD.—The directors on January 15 voted unanimously to approve the terms of the agreement which has been made between the chairman of the board and the attorney general of the United States by which the New Haven is to divest itself of nearly all of its subsidiaries. See an item in these columns last week.

G. L. Stone, of Hayden, Stone & Co., Boston, has resigned as a director of the New York, New Haven & Hartford, the reason given being that he is a large holder of securities of the Eastern Steamship Corporation. The resignations of J. P. Morgan and Edwin Milner were also accepted.

See also Boston & Maine.

PENNSYLVANIA NORTHERN & PITTSBURGH.—See Lake Erie, Franklin & Clarion.

PENNSYLVANIA SOUTHERN.—See Lake Erie, Franklin & Clarion.

ST. LOUIS & SAN FRANCISCO.—The receivers have secured an injunction restraining the Southern Railway from taking sole possession of the New Orleans Terminal Company. It enjoins the Guaranty Trust Company from handing over half of the stock in the New Orleans Terminal Company, owning the terminal, to the Southern Railway, which owns the other half, pending the determination of the suit which has been instituted. By the terms of the agreement made after the organization of the New Orleans Terminal Company in 1903, the New Orleans company's stock was to be forfeited in case either railroad defaulted in its share of the bond interest. After receivers were appointed for the Frisco road, it defaulted on the payment of its half of \$280,000 interest due on a \$14,000,000 bond issue. The Southern Railway paid all the interest and demanded that the Frisco stock be turned over to it under the forfeiture provided in the lease. Justice Gavegan held that the provision in agreement for forfeiture of the shares might be declared void upon trial, as under it Frisco was asked to surrender its interest in the terminal company without being relieved of responsibility for payments provided for in the document.